COMMERCIAL MOTOR TRANSPORT EXHIBITION—II

BRITISH COMMERCIAL VEHICLE BUILDING INDUSTRY

See Page 2

MODERN TRANSPORT

"THE TIMES" OF THE TRANSPORT WORLD

PREVIEW OF BRILLIANT SHOW AT EARLS COURT

See Page 3, etc.

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CURRENT TOPICS

New Bristol Bus Station

REDEVELOPMENT of the centre of Bristol, which suffered so badly from enemy bombing in 1940, has been proceeding steadily even though much still remains to be done. One result has been to create a new shopping centre at Broadmead and it was particularly fortunate that the Bristol Omnibus Co., Limited, had close at hand the site of the permanent way depot of its former tramway system. This site, with sundry additions, accommodates the new country bus station and depot which came into use on September 21 and was formally opened the following day by the Lord Mayor of Bristol (Alderman F. G. W. Chamberlain). Speaking at a luncheon which followed the ceremony, Mr. Stanley Kennedy, chairman of the company, referred to the reduction in congestion which had resulted from the removal of the country service vehicles from the pavement sides and the reorganisation of the city services which had been carried out simultaneously. [This rearrangement and the layout of the new bus station will be the subject of an article in a subsequent issue.] Mr. Kennedy went on to express the hope that the improved facilities would, in their turn, bring in more passengers, and the Lord Mayor in his reply emphasised the anxiety of the city to encourage people to come into it from the country. He was sure that the new bus station would help in that respect.

Further L.T.E. Economies

PLANS are announced by London Transport for a further cut of costs on the Underground system which have been submitted for approval through the consultative committee machinery. Mornington Crescent Station, lightly used and for many years called at only by Highgate Line trains, will be still less needed when the Carreras factory is moved to Basildon and will be closed completely. Service will also be withdrawn from the Holborn—Aldwych branch, enabling Aldwych to be closed, and from the Acton Town—South Acton spur. The route of the first is covered by 75 buses an hour in the peak while the line in Acton attracts little traffic and connection can be made by bus, with a 330-yd. walk between Acton Town and Acton Central London Midland Region Station. Six stations will be closed on Sundays from October 5—Chancery Lane, Essex Road, Fairlop, Shadwell, Temple and Shoreditch. The entire Underground service will start about 30 min. later, with trains arriving in the central area about 6.15 a.m., and close down around midnight instead of at 12.30 a.m. The Aldwych branch is the rump of the original Great Northern and Strand Railway, left isolated by the adaptation of Holborn Station to serve the through route of the Great Northern, Piccadilly and Brompton Railway, when the scheme was enlarged by Charles Tyson Yerkes. Handicapped by the impossibility of running through southbound trains (a theatre special ran northbound once each night for a time before 1914 from Aldwych—then Strand—to Finsbury Park), it has carried on an unequal struggle for half a century. The 56-chain Acton—South Acton line was authorised in 1878 to make a connection between the Metropolitan District and North and South Western Junction Railways. It was not completed until 1899, when material for the Ealing and South Harrow line moved over it. At one time the District contemplated opening goods yards on its western lines and using this spur for access, but the junction was removed in 1915. Passenger service to Hounslow began on June 13, 1905; with the Piccadilly Line westward extension in 1932 the track was singled and a single-car shuttle took over the Acton Loop.

Year of Achievement

CONFIDENT in the belief that higher productivity is the most effective weapon with which to counter foreign competition, the British Motor Corporation has, since 1955, invested £40 million on factory extensions, new equipment and improved service facilities. B.M.C. Service, Limited, formed in 1956 to deal specifically with parts distribution throughout the world, now holds some £8 million worth of spares at Cowley, and controls a special technical service branch which is concerned with organising through distributors and dealers an effective technical liaison with all users of B.M.C. cars, commercial vehicles and tractors. Other schemes now nearing completion include a new engine and gearbox replacement plant at Foleshill, Coventry, where a planned production of 4,000 power units a week will exactly double former output, and a new £3 million paint shop at Cowley. This building covers an area of seven acres and houses one of the most efficient car-manufacturing paint plants in existence with a capacity to turn out completely painted car bodies at the rate of one a minute. It must be a matter of immense satisfaction to all who have had a hand in these projects, that returns for the financial year ended July 31, 1958, confirm that the B.M.C. sales figure of 504,712 vehicles of all types is the highest ever achieved in a 12-month period by a British or European manufacturer.

Some Somerset Canal Works

AN unusually interesting series of visits was made during a recent weekend by members of the Railway and Canal Historical Society, who based their journeys on Bradford-on-Avon in Somerset. The western portal of Box Tunnel, opened as part of the Great Western broad gauge main line on June 30, 1841, and the longest railway tunnel in England when built, was among the chosen venues and attention was also paid to the beautiful architectural details of the Avoncliff and Dundas aqueducts on the Kennet and Avon Canal, on a section more or less completed in 1799. Claverton pumping station supplies the nine-mile pound between the Bradford and Bath locks and is remarkable in that a waterwheel 25 ft. wide and 19 ft. 4 in. in diameter lifts the water 53 ft. out of the River Avon. It was built in 1813. Two of the sites inspected were where canals had to overcome considerable differences of level. At Combe Hay, on the Somerset Coal Canal, the original intention was to use Weldon's lifts; the first was to move boats through 46 ft., for which purpose the structure was 88 ft. high. The boat passed—apparently through a tunnel—into a coffin-like box which then went up through the water-filled chamber set in the hillside to the upper level of the canal near where Caisson House now stands.

Changes of Plan

UNFORTUNATELY the walls bulged and the work, begun in 1796, was abandoned after some trying incidents in May, 1799. It had worked without hitch on a few occasions only. An inclined plane, with coal containers passing between the two sections of canal, followed temporarily; eventually a joint venture of the Kennet and Avon, Wilts and Berks and Somerset Coal Canals built a flight of 22 locks with the unusual feature of a reversal for the boats about midway. On a branch of the otherwise unmade Dorset and Somerset Canal, not far away, near Mells, five of Fussell's patent balance locks were to have been used to climb the hillside and the specimen built proved more successful than Weldon's apparatus. Unfortunately even the short Frome—Stratton Moor branch was not completed owing to shortage of capital and the works became derelict about 1802, although used in part half a century later for a mineral railway, just as the Somerset Coal early this century became, over part of its course, the site of the Camerton and Limpley Stoke Light Railway, scene of the film *The Titfield Thunderbolt* before it was dismantled. The site of Fussell's lifts near Mells was almost unknown until two years ago, when the researches of Mr. Robin Atthill, who led the R.C.H.S. party, disclosed it, but a good deal of the route can be traced.

Structural Steel

AFTER four years of building at a cost of £20 million, Dorman Long and Co., Limited, has recently brought into operation, at Lackenby, near Middlesbrough, a new steel rolling mill which is the first in this country to be specifically designed for rolling structural beam and column sections. The new mill is capable of producing any of the present range of British standard sections, but its main purpose is to roll the more efficient universal beams, ranging in lengths of up to 75 ft. from the largest, which is 36 in. deep and weighs 260 lb. per foot, to the smallest at 6 in. and 20 lb. per foot. This represents a range such has never before been available to structural designers in this country, and in the larger sizes it will eliminate the built-up beam. Generally speaking, the method of rolling universal beams is still the same as in the first successful mill developed by Henry Grey and built at Luxembourg in 1902. In this type of mill four rolls, two vertical and two horizontal, all with their axes in the same vertical plane, apply pressure to all faces of the beam at the same time. An idea of the size of the new Lackenby Mill may be gauged from the fact that the main building has a length of almost 3,000 ft. and required 19,600 tons of steelwork, 140,000 cu. yd. of concrete and 700,000 cu. yd. of excavations. It has a capacity of from eight to 10 thousand tons of beams per week, and coming, as it does at a time when the demand has already fallen, it should have the effect of making steel more competitive both in price and delivery with other structural materials, such as reinforced concrete. Insofar as the needs of transport are concerned, and especially in connection with the highway and railway modernisation schemes, it will give engineers a wider choice of materials and help towards more rapid methods of construction. On the sales side it has given the steel industry a new tool with which to regain the initiative in the structural field, after a long period impeded by the evils of short supply.

Dracones

DEMONSTRATED last week under the auspices of the National Research Development Corporation, of which Sir William Black is chairman, was a new method of transport for liquids lighter than water which offers some exciting possibilities. The idea of Dracones or flexible barges has been developed by Professor W. R. Hawthorne, F.R.S., Sir Geoffrey Taylor, F.R.S., and Mr. J. C. S. Shaw, M.A., of Cambridge University, since 1956; the production model now shown is 5 ft. in diameter, 100 ft. long and it was carrying 10,400 gal. of kerosene (specific gravity 0.796) weighing 37 tons. The early troubles of snaking and yawing have been remedied and the size shown appears capable of being towed by a small craft and doing useful work in inland waterways. Larger models intended for seagoing voyages will be developed later. The flexible skin is made of woven nylon fabric with synthetic rubber coatings capable of resisting petrol or fuel oil on the inside and sea water and sunlight on the outside. There are protective noses at each end which contain the pipe connections. The Dracone can resist rough water when loaded and can be wound on a reel when empty and easily transported elsewhere for its next load. Capital and operating costs of this British invention are expected to show a marked reduction over conventional tank barges.

Tommy Hopwood to Retire

FOR just half of the career of the Bell Punch Co., Limited, Mr. T. M. Hopwood has been in its service. Now, after 35 years the time has come for him to retire as already announced in MODERN TRANSPORT and it can be claimed confidently that few representatives of a manufacturer will be so greatly missed by his friends in the industry. Tom Hopwood had a notable military career in the turmoil of 1914-18 and then topped up his experience of life by becoming secretary to André Simon, the universally known expert on wines. Import duties having hit the wine business hard, Hopwood, in 1923, joined Bell Punch to record the case histories of ticket punches. The vintners' loss was transport's gain, for Tommy has become very well known indeed; he is liked for himself as an individual and as a leading expert in transport cash collection systems which he has devised around the various products of the Bell Punch organisation, to serve undertakings of all descriptions in many countries of the world. He sees the fare collection equipment and records not only from the accountant's and auditor's angle, but from that of the man who has to use the machine and collect the fares in a crowded vehicle. That has been the secret of his success in solving "human" problems in fare collection. His versatility and zest for life are amazing; now a keen gardener, he was in earlier years a highly successful captain of the West Middlesex cricket club, but he also played left back for Wood Green in the Spartan League. His many friends will wish him well in the leisure he will have after October 31, when he leaves the position of manager of the Bell Punch traffic and printing department, and will hope that his retirement is a long and happy one.

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The Editor is prepared to consider contributions offered for publication in MODERN TRANSPORT, but intending contributors should first study the length and style of articles appearing in the paper and satisfy themselves that the topic with which they propose to deal is relevant to editorial requirements. In controversial subjects relating to all aspects of transport and traffic this newspaper offers a platform for independent comment and debate, its object being to encourage the provision of all forms of transport in the best interests of the community.

A Resilient Industry

PURCHASE tax, instituted in wartime to control consumption of luxury commodities and to deflect the public's money into more desirable channels, has lingered on—nay, flourished—in peacetime to bedevil many activities. Few realise, for example, its hampering effect on the training of young engineers who are penalised by purchase tax on the equipment and components of model making. On the commercial vehicle industry its effects are clear, as expounded on page 17 in a message to readers written by Sir Henry Spurrier in his capacity as chairman of Britavema. At a pre-show display of Rootes group commercial vehicles Sir William Rootes dotted the i's and crossed the t's on this subject. The motor industry's contribution to this country's manufactured exports is 18 per cent and runs at the rate of £550 million a year. Everyone would feel the effects of economic recession in such an industry and, in fact, the economic prosperity of the U.K., he said, cannot be maintained without a prosperous and expanding automobile industry. With such a background the purchase tax on commercial vehicles—the only important item of capital goods for industry that now attracts it—is indefensible.

Plea to Chancellor

SIR WILLIAM ROOTES continued: "One would think that the authorities look upon the industrialists of this country as buying trucks for fun, whereas the contrary is the case. The tax inevitably adds to industrial and constructional costs; it restricts home demand and therefore hampers increased production—and this at a time when we are seeking to expand world trade, which in turn demands that we, as a country, must produce at highly competitive prices. At a time when the banks are beginning to give us things—when the Government is seeking to remove restrictions—I venture to say it is time that the Chancellor of the Exchequer and the President of the Board of Trade should give very serious consideration to the removal of the purchase tax on commercial vehicles in this country in order that industry itself may become more competitive, and our balance of payments from a world point of view may be strengthened; and we can, by increased efficiency, compete in world markets." The European free market was going to make it even more important, he concluded.

One of World's Largest Exporters

NEVERTHELESS, as Mr. Reay Geddes, president of the Society of Motor Manufacturers, has pointed out, this resilient industry exports more goods and passenger carrying vehicles than any other European manufacturing country and little fewer than the U.S.A. Our commercial vehicle builders shipped from their factories no fewer than 61,500 vehicles worth £43 million in the first half of this year out of 166,000 produced and the July export figures, the latest available, of £8½ million earned were the highest ever for that month. These wonderful results are due to technical excellence and know-how in manufacturing and considerable market research. Despite the fact that users always want something more in the way of performance or design or a new approach to beat local taxation requirements, the British builder is able to meet a very wide range of demand in all parts of the world and to back sales with good service. Besides the vehicles made in very large numbers indeed—and even these offer hundreds of permutations of optional dimensions and equipment in most ranges—there are several old-established firms which can provide tailor-made chassis or bodywork to the exact needs of a customer at an economic price, an invaluable facet of the British commercial vehicle industry. The display of its products beginning this week at Earls Court, London, and continuing until October 4, is the most comprehensive yet staged and shows some interesting trends since the last Commercial Motor Transport Exhibition in 1956.

Design Trends

ONE such trend is undoubtedly the haste with which makers are providing designs for the small bus market now that regulations have been made to deal with them. Some of the background to the micro-bus technique has already been discussed in our editorial columns. Would-be users will have the choice of B.M.C., Bedford-Martin Walter, Ford, Karrier-Walker and Kenex units to inspect at Earls Court. On the other hand the demand for the big bus, now capable of fulfilment through the extension of overall length on two axles to 30 ft., is undoubted and vehicles of up to 78 seats will be shown. It would seem that among large operators comparatively few beside London Transport and Midland Red are convinced of the merits of a fully integrated design and others are content with a modest interdependence of chassis and bodywork. The rear-engined Leyland 78-seat Atlantean accordingly appears as a chassis-mounted design, while the A.C.V. group offers the 76-seat "wheel-barrow-mounted" Bridgemaster as a larger version of the London Transport 64-seat integral Routemaster and the only integral double-decker on the market. Greater ingenuity in overcoming low-bridge problems without inconvenience to passengers is manifest, a trend sparked off by the Bristol Lodekka and its appearance on the open market as the Dennis Loline. There is an almost 100 per cent switch to air-pressure brakes on large buses and all manufacturers are providing more power and, as an option, fully automatic transmission. The 34 ft. 6 in. single-deck trolleybus for home use presages a new angle on overseas sales of vehicles over 30 ft. in length.

Turbocharger Progress

THE first production turbocharged engine in a p.s.v., a Daimler with B.S.A. blower, makes a welcome appearance to those of us who have long advocated its potentialities and seen how it can assist freight vehicle power output. We foresee higher specific power enabling a more compact disposal of the power plant if this possibility is followed up, with potentially a more favourable fuel consumption figure. In freight vehicles the filling-in of the load capacity gaps in the Commer-Karrier range should be popular; the nine-ton four-wheeler appears in the Leyland and Albion series. Extensive reference has already been made to the Thornycroft Mastiff four-wheeler in the same class of maximum load carrier. In the Foden range a lightweight eight-wheeler can achieve a 17-ton payload with suitably simple bodywork. Another feature of importance to the trader user and parcel carrier is the step forward made in delivery van design by such vehicles as the Dennis Paravan and the Standard Atlas; the last mentioned has engine and gearbox tucked away amidships to give good design of the cab free play and for overhaul purposes they come out very simply, the front axle forming a carrying truck. Manufacturerers' research has placed many new designs of vehicle and component at the operator's disposal and such developments as air springs, disc brakes and power steering presage further progress in reliability, performance and efficiency.

Forthcoming Events

Until October 3.—Industrial Fuel Efficiency Exhibition. At Olympia, London.
Until October 4.—Commercial Motor Transport Exhibition. At Earls Court, London.
September 27.—Light Railway Transport League. Paper by Mr. M. J. Lea, "A Tram Ride from Aachen to Dortmund." At 153 Drummond Street, N.W.1. 3 p.m.
Light Railway Transport League. North American tramway films by Mr. H. Luff. At University, Southampton. 6.30 p.m.
September 28-October 7.—International Railway Congress. At Madrid.
September 29.—Passenger Vehicle Operators Association. Annual dinner-dance. At Grosvenor House, London.
Railway Correspondence and Travel Society (Northampton). Paper by Mr. R. E. Tustin, "The Lynton and Barnstaple Railway." At the Liberal Club, Castilian Street, Northampton. 7.30 p.m.
Institute of Transport (Humberside). Paper by Mr. N. W. Rolfe, "Road Passenger Transport." At Chamber of Commerce and Shipping, Samman House, Bowlalley Lane, Hull. 7.30 p.m.
September 30.—Railway Correspondence and Travel Society (East Midlands). Paper by Mr. R. A. Savill, "The North Eastern Region of British Railways." At N.C.S. Guild Room, Toll Street, Nottingham. 7.30 p.m.
October 1.—Institute of Petroleum. Paper by Messrs. D. L. Pratt, G. M. Christie, E. F. Coxon and J. R. Lodwick, "Fuels and Lubricants for the Trans-Antarctic Expedition." At 61 New Cavendish Street, W.1. 5 p.m.
Electric Railway Society. Paper by Mr. G. W. Morant, "A European Survey." At 153 Drummond Street, N.W.1. 7.15 p.m.
October 2-12.—International Motor Show. At Paris.
October 3.—The Railway Club. Paper by Mr. A. W. H. Pearsall, "The Furness Railway." At 320 High Holborn, W.C.1. 7 p.m.
October 4.—Omnibus Society. Annual dinner. At Clarendon Restaurant, Hammersmith, W.6. 7 for 7.30 p.m.
Railway Correspondence and Travel Society. "The Sapper" Rail Tour
October 13-15.—Road Haulage Association. Annual conference. At Torquay.
October 22-November 1.—International Motor Show. At Earls Court, London.
October 26-31.—International Road Federation world meeting. At Mexico City.
November 5-16.—International Motor Show. At Turin.

PASSENGER COACHWORK

Wide Range of Seating Capacities at Earls Court

LARGE DOUBLE-DECKERS IN PROFUSION

Typifying the new interest in small p.s.v.s is this Karrier with Walker 12-seat body

THE present economics of bus operation have had obvious repercussions upon the passenger vehicle exhibits in the present show at Earls Court. There is, as might be expected, a marked increase in the number of double-deckers built to the maximum dimensions and possessing high seating capacities while there is also, at the other end of the scale, tangible evidence of the ability of bodybuilders to meet the potential demand for vehicles of microbus capacity. More use has been made of lightweight materials as an aid towards improved fuel consumption and consequent operating economy and there is also indication of increased attention to ventilation and heating, while a number of manufacturers has front-entrance double-deckers with enclosed platform under the control of the driver—a form which some operators consider necessary to reduce pressure on the conductors of the larger-capacity buses.

One version of the Leyland Atlantean is that which appears on the stand of Walter **Alexander** and Co. (Coachbuilders), Limited **(Stand No. 51)**. This is a normal height version accommodating 78 passengers with 34 in the lower and 44 in the upper saloon. The upper deck floor is of one piece resin bonded ply and covered with Crestaline, the centre gangway being fitted with Treadmaster ribbed tread. On the lower deck the floor is of resin bonded ply on the seat platforms, which are directly mounted on the chassis underframe. The centre gangway is of folded aluminium alloy stiffened to give rigidity. The body is of all-metal construction consisting of light steel and alloy members. Jig assembly ensures the interchangeability of a number of sub-assemblies.

Luxury Coaches

Five vehicles with bodywork by H. V. **Burlingham,** Limited, appear at the show. Three which appear on the builder's own stand **(No. 37)** are all single-deckers. The Seagull body design is now very well known and may be seen in two versions. The Mark VII lightweight luxury coach is intended for underfloor-engined chassis and, in this case, employs the Leyland Tiger Cub. Seating 41, it is of metal-framed construction and its front entrance has a single-panel inward-opening door. There are two Weathershields three-way lift-up panels in the roof. These measure 7 ft. long by 2 ft. wide as does a third panel which is fixed. All three are glazed in Perspex. The other version of the body is the New Seagull which is designed for the Bedford and Commer Avenger chassis. That in the show employs the latter whilst a Bedford demonstrator is in the coach park. Many of the features are common to both bodies but the New Seagull, which, at 44 cwt., weighs 2 cwt. less, has an outside sliding door for its front entrance and the roof has four panels, each 3 ft. square, of which two can be opened. The third vehicle, on a Maudslay Reliance chassis, is a dual-purpose tion and has the somewhat unusual dimensions of about 35 ft. long by 8 ft. wide.

New Front Ends

Bodies built by **Duple** Motor Bodies, Limited **(Stand No. 44)** and by its associated Duple Motor Bodies (Midland), Limited **(Stand No. 43)**, incorporate various new features. In the case of the former, wraparound fixed screens have been adopted in view of the concession granted under the new p.s.v. regulations. In order to provide the adequate demisting and defrosting now required and to provide ventilation at the front of the body a 4½-kW. Smith's demister with two-speed motor and heat control is a standard fitting on models with fixed screens. Passenger visibility at the rear has been improved by extending the rear Dee lights and increasing the width of the back window. Perspex canopy lights with blinds and two opening roof vents and one fixed roof light remain as standard fitments. New moulding schemes allow for up to four exterior colour combinations and wheel spats are now fitted as standard on most models. Increased tumble home from cant to skirt improves the external body appearance and detachable lifeguards are dispensed with under the new regulations.

Front-entrance bodywork on underfloor-engined chassis is offered in composite construction—the Britannia—or metal framed—the Donington. Both models have newly designed dual-purpose front ends capable of receiving an inward opening coach door or bus type doors as an option initially or as a conversion later. This is to satisfy the needs of the operator wishing to use vehicles on stage carriage work after a period of coach operation. The Britannia on show, which is for Smith's Luxury Coaches (Reading), Limited, employs an A.E.C. Reliance chassis and has full-drop windows.

The Britannia body is also available with a centre entrance and conventional sliding door.

Front Screen Design

Metal-framed bus bodies built at the Duple Motor Bodies (Midland) factory will be available for underfloor-engined chassis, Bedford SB, Bedford C4/5 and Thames p.s.v. chassis. The front screen design adopted has been produced by the Duple engineers to take maximum advantage of the concession of fixed windscreens now permitted under new regulations. The improved arrangement consists of two fixed screen glasses, the offside being of a wraparound single curvature type with maximum lay back to eliminate reflection, whilst the nearside is a flat glass of orthodox service bus pattern. Both screens are glazed in G.M.-type rubber glazing section. This is shown on a Maudslay Reliance 45-seater for Jones Omnibus Services, Limited, of Aberbeeg.

There is a Super Vega 37-passenger composite luxury coach on a Bedford SB3 petrol-engined chassis and a 41-seat composite luxury coach with driver-operated manual control sliding door on a Commer Avenger chassis with Rootes diesel engine for Greatrex Motor Coaches, Limited. A Donington metal-framed 41-seat front entrance coach on a Leyland Tiger Cub chassis appears in the livery of the Sunderland District Omnibus Co., Limited, as does an exhibit of the alternative front end for Donington or Britannia front entrance coachwork. Glider-type doors with driver manual control are shown but jacknife doors can be supplied if desired. Exhibits in the demonstration park are a 41-seat Super Vega coach on a Bedford SB3 petrol-engined chassis, a 29-seat Super Vista coach on a Bedford C4Z2 petrol-engined chassis with wheelbase extension, a 41-passenger luxury coach on a Commer Avenger chassis with Rootes diesel engine, a 43-seat metal-framed standard service bus on Bedford SB1 diesel-engined chassis with two-speed axle and a 30-seat metal-framed standard service bus on a Bedford C5Z1 diesel-engined chassis with wheelbase extension.

Transcontinental Tours

One of an order for 20 A.E.C. Reliance coaches seating 41 from Maidstone and District Motor Services, Limited, appears on the stand of Thomas **Harrington,** Limited **(No. 35)**. The seats are of the bodybuilder's own construction and the heating is by three Clayton Dewandre underseat recirculatory units. There are three lift-up roof ventilators and, for the special benefit of the driver and the passengers in the front of the coach, fresh air is introduced at the front of the roof and there are frontal louvres in the bulkhead. The other coach on the stand is a 37-seat touring model for Creamline Motor Services (Bordon), Limited, which shares many of the features of the Maidstone and District coach including the make of chassis and seats, but has two lift-up roof ventilators instead of three. Special interest attaches to the Harrington vehicles in the demonstration park. One is a newly designed 41-seat body on the Bedford chassis and the other is an all-metal transcontinental touring coach for the Garrow-Fisher service between London and Bombay. Employing an A.E.C. Mandator III chassis it is 8 ft. wide and approximately 31 ft. long, while it also tows a trailer for additional baggage and equipment. There are seats for 26 passengers, a co-driver and a courier and the vehicle completely air-conditioned. Care has also been taken to ensure that it is dust-proof and the kitchen at the rear houses a three-ring cooker, a tea urn, a sink with running water and food storage space. Apart from the trailer and storage boxes under each seat, there is a roof luggage rack with an access ladder that can be stored in the trailer.

Small buses figure on the stand of **Kenex** Coachwork, Limited **(No. 131)** where its Kenecoach 11-45-seater intended for bus service or private hire. There is a manually operated jacknife door at front and there are four extractors fitted in the roof and a permanent air intake in the lower front panel.

The bodybuilder's standard stressed skin construction, with steel framework in the lower and alloy framework in the upper saloon and alloy stress panels, is employed in the Wolverhampton Corporation 68-seat double-decker on a Guy Arab chassis which appears on that manufacturer's stand **(No. 62)**. The fully fronted body has a front entrance and driver-operated Peters door gear. The stairs are placed on the offside immediately behind the driver's cab and fittings include Beclawat Simslide double-sliding windows, a Clayton cab heater and demister, Accles and Pollock tubular seats with Dunlopillo cushions and C.A.V. flashing indicators. The body weighs 69 cwt. The fifth Burlingham body is a 50-seat single-deck B.U.T. trolleybus **(Stand No. 88)** for Glasgow Corporation. It is of all-metal construc-

One-man operation is being increasingly adopted on light traffic routes. This Albion Nimbus has a Willowbrook body

recent revision of the Conditions of Fitness Regulations and the 12-seat Utilabus version of the Bedford light van is the result.

M.C.W. Exhibits

The close connection of Metropolitan-Cammell-Weymann with the Leyland Atlantean was apparent in our description of this new high-capacity double-decker in our issues of September 6 and 13 and three examples are at Earls Court. A low-height version built at Elmdon for J. James and Sons, Limited, is on the Leyland stand **(No. 75)** while a normal height 78-seater for Wallasey Corporation is shown by **Metropolitan-Cammell** Carriage and Wagon Co., Limited, on **Stand No. 46.** There it is accompanied by a Series II Olympic for South America. This integrally constructed vehicle, it may be recalled, incorporates running units of the Leyland Worldmaster Royal Tiger. **Weymanns,** Limited, on the adjoining stand **(45)** has the third Atlantean, which is one of the 73-seat low-height models ordered by Maidstone and District Motor Services, Limited, for trolleybus replacement in the Hastings area. The other occupant of this stand is a dual-purpose Olympian 41-seater for Western Welsh. This is a chassisless vehicle and uses Leyland Tiger Cub running units. Another M.C.W. body on a manufacturer's stand is a Sunbeam trolleybus **(Stand No. 63)**. Mounted on the MF2B two-axle chassis it is 30 ft. long and 8 ft. wide and seats 63 passengers. Construction of this double-decker, which follows the customary Bournemouth Corporation practice of having two staircases and rear entrance and front exit, is of the patented M.C.W. Mark 1 metal system.

All three exhibits on **Stand No. 47** are double-deckers and **Northern Counties** Motor and Engineering Co., Limited, has in each case made full use of the 30 ft. by 8 ft. dimensions. One, with a front entrance, for the Potteries Motor Traction Co., Limited, seats 69 passengers and is of semi-lightweight construction on a Daimler CVD6-30 chassis with the CD6 turbocharged diesel engine. The metal-framed body on a Dennis Loline chassis with Gardner 6LW engine for Middlesbrough Corporation has a rear entrance and seats 67. Its overall height unladen of 13 ft. 5 in. indicates the possibilities offered by this model for those troubled with low bridges. The third body is for Lancashire United Transport and is mounted on a Guy Arab chassis, also with Gardner 6LW engine. It too has a rear entrance and its seating capacity is 73.

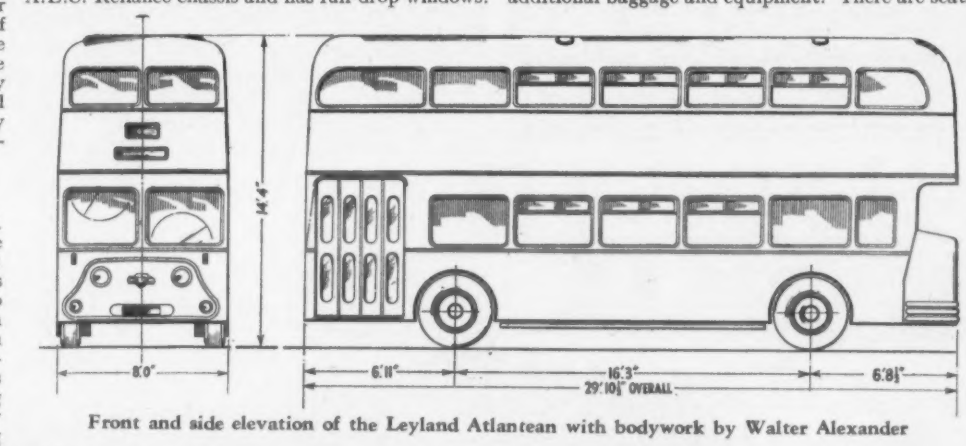
Production RM

The stands of **Park Royal** Vehicles, Limited **(No. 89)** and its fellow member of the P.R.V. group, Charles H. **Roe,** Limited **(No. 90)** are adjacent. The former carries the first production model of the RM-type 64-seat double-decker for London Transport and a front-entrance double-decker for the East Kent Road Car Co., Limited. The fully fronted body seats 72 and is mounted on an A.E.C. Regent V 18 ft. 7 in. wheelbase chassis. The body is 30 ft. long as is the Leyland Titan double-decker for Leeds City Transport on the Roe stand. The latter is of composite construction and seats 71. The continuing success of the Dalesman luxury coach body has led to the production of Mark IV and a Maudslay Reliance so fitted for Liss and District Omnibus Co., Limited, makes the second exhibit on the Roe stand. It is a 43-seater.

This is by no means the total of P.R.V. participation in the show since there are on the A.E.C. stand **(No. 85)** a 30 ft. long Bridgemaster for Sheffield Transport Department and one of the 250 Regent V double-deckers for the Tehran Omnibus Board now being built by Park Royal. The Bridgemaster may be used for an interesting comparison with an example of the 27 ft. long version for Western Welsh which appears in the demonstration park. The difference in length

(*Continued on page 15*)

Metal-framed Duple service bus body showing the new windscreen arrangement; A.E.C. Reliances with, left, Willowbrook and, right, Harrington bodywork and an M.C.W.-Leyland Olympian incorporating Tiger Cub running units



Front and side elevation of the Leyland Atlantean with bodywork by Walter Alexander

Among the exhibits is one of the 250 A.E.C. Regent V double-deckers with Park Royal bodywork for the Tehran Omnibus Board; contrasts in Northern Counties bodies are provided by this Daimler CVD6 for Potteries and the Dennis Loline for Middlesbrough Corporation; right, a Burlingham-bodied Guy Arab for service in Wolverhampton—the chassis builder's home town

LORRY—BUS—COACH

Dover-Calais Vehicle Ferry Plans

BECAUSE of the volume of advance interest displayed, European Ferries, Limited, an associate company of Townsend Brothers Ferries, Limited, the car ferry operator between Dover and Calais, has disclosed its intention, in a letter to potential users, to inaugurate a transport vehicle ferry between the same ports later this year. All classes of commercial vehicles, containers or pallets would be accepted; one vessel of the LST class would be used as cargo offers at the outset. It is anticipated that charges will be similar to those on the Tilbury—Antewerp ferry, but it is thought that port charges will be lower on the throughout shipment.

Eyes on Gatwick

A Radford (Nottingham) coach operator, Skill's Motor Coaches, has applied to the traffic commissioners concerned for all-year-round day excursions to the new Gatwick Airport. It already operates excursions to London Airport, which are said to be very popular.

C.I.E. Does Well on Tours

ALL-IN coach tours have this summer set a new record for Coras Iompair Eireann. By the end of July the company had carried on its tours 5,797 passengers—100 more than last year's total—and bookings were still heavy. The summer tours operate until the end of September but special autumn six-day tours will operate throughout October.

Hastings Economies Modified

IN response to further representations by Hastings Corporation Transport Committee, Maidstone and District Motor Services, Limited, has agreed not to proceed with certain of the more drastic early morning and late night service economies it had proposed to make when the Hastings trolleybuses come off the road. Withdrawal date for the trolleybuses will now probably be in April, 1959.

London Busmen's Threat Abandoned

WARNED by the T. and G.W.U. general secretary, Mr. Frank Cousins, that it would, if carried out, only harm the general public, the London busmen's negotiating committee has decided to abandon its threatened work-to-rule campaign in retaliation for service economies introduced or to be introduced by London Transport. It was believed that there was no widespread support for the proposed working to rule. There was to be a meeting yesterday (Friday) between representatives of the union and of London Transport to discuss further the new schedules.

A New Sort of Kerb Drill

DETAILS of a campaign to be launched with the slogan "Kerb Space is Precious," aimed to cut down if possible the waiting time of commercial vehicles in busy thoroughfares, is being prepared by the T.R.T.A. The Minister of Transport has accepted an invitation to inaugurate the campaign at a luncheon in London on October 20. A T.R.T.A. leaflet will contain suggestions for traders how to reduce time spent at the kerb. It is expected that about 250,000 copies will be sent out in the initial stages. The campaign will be confined for the time being to the London traffic area.

Southdown Sees Retrenchment Period

ALARMED at the continued movement away from public transport, Southdown Motor Services, Limited, was likely to apply for still further reductions, said Mr. G. Duckworth, its traffic manager, applying to the South Eastern area Traffic Commissioners at Chichester for the reduction or curtailment of services affecting Hayling Island, Southwick, North Boarhunt, Emsworth, Rowlands Castle and Hindhead. Mr. Duckworth told the Commissioners: "We are not failing to shoulder our responsibilties where an extension of services is required to serve the public's needs. We are not burying our heads in the sand—we are out to get the passengers when they are there to get."

Birthplace of a motorway—a Bedford tipper negotiating some very heavy going on the London—Birmingham motorway site at Upper Heywood, near Northampton

Newcastle Unloading Ban Comments

STRONG opposition is expected from Newcastle upon Tyne Chamber of Trade to a recommendation by the City Traffic Committee that the loading and unloading of vehicles in certain main streets should be banned at certain times of the day. The committee's recommendation is that loading and unloading should be prohibited between 8 a.m. and 10 a.m., 12 noon and 2 p.m., and 4.30 p.m. and 6 p.m. At a meeting of the Chamber of Trade, Mr. F. Milton (National Road Transport Federation) said that instead of easing congestion, the new proposals would result in greater chaos. For the wholesale fruit and potato trade, Mr. W. F. Leatherland said that if the City Council got away with the plan, it would be extended later to all the city's streets. Representatives of bakers, caterers and grocery firms also stated that the plan would be unworkable and have a serious adverse effect on business.

Summonsed in Two Bites

WHEN the Newburn (Northumberland) haulage firm, T. T. Walker, Limited, was charged at Newcastle upon Tyne with offences relating to B licences in respect of radius and goods carried, Mr. T. H. Campbell Wardlaw, defending, refused to take any part in the case, and refused to submit any defence pleas. He had previously unsuccessfully submitted that the charges, comprising 28 summonses, were heard with other summonses, by the magistrates in February this year. Mr. Wardlaw stated that at the February hearing there had been 45 summonses against the operator. The prosecution had agreed to tender evidence on 17 summonses, each being typical of summonses in respect of different vehicles. His clients had been found guilty in seven instances and not guilty in 10.

Mr. Wardlaw asserted that he had entered pleas of not guilty in respect of the remaining 28 summonses, and contended that these summonses had been dealt with. Mr. J. L. R. Croft, for the prosecution, said that no pleas on the 28 summonses were made at the February sitting. The magistrates agreed that the charges should proceed. Defendant was fined £2 on each of 27 summonses and one summons was withdrawn. The firm was also ordered to pay £11 14s. 6d. costs.

Power Station Coal Delivery

LAST week representations were made to Lord Mills, Minister of Power, by the R.H.A., and an informal discussion took place between the Minister of Transport, Mr. Harold Watkinson, and Mr. R. Morton Mitchell, chief executive officer of the association, on the subject of a reported agreement between the Central Electricity Authority and the British Transport Commission for the transfer of coal for power stations from road transport to rail transport. The points made were that the possible transfer of what might amount to several millions of tons of coal traffic from independent road hauliers would mean not only that they lose a good deal of revenue, but also that some of them will be put out of business so that they will not be available during any future railway or other emergency. The R.H.A. emphasised the need for careful inquiry into any direct and possibly exclusive agreement between two nationalised industries.

Nottingham Bankruptcy Hearing

A FIRST meeting of creditors was held in Nottingham on September 10 of Duffield Transport, Limited, Colwick Road, Nottingham, and formerly of Duffield, Derbyshire, which had a winding-up order made against it in the High Court in July this year. It was on the petition of a debenture holder, whose claim was for £9,635. The company was incorporated in 1949, with a nominal capital of £1,000 in £1 shares, increased to £10,000, of which £8,000 was issued. The control of the business passed to Mr. M. S. Frank, a chartered accountant, of Nottingham. Since October, 1956, the company had been "virtually dormant," it was stated. A statement of affairs was not lodged, but Mr. Frank said the company's liabilities were the claim of £9,635, and one to himself of £1,580 on loan account, and £300 on P.A.Y.E. tax deductions. Proof of debt had been lodged by the Inland Revenue of £425, which was for Schedule "D" tax for 1957-58, but he considered this claim would be cancelled because the company had ceased trading some time ago. He estimated assets at £12,181, the principal item being £11,805 owing on loan account by an associated haulage company which was also operated from Colwick Road. This, it was stated, would be paid in full.

Bus and Coach Developments

R. E. Wake, Sparkford, seeks the licences of West End Garage (Bruton), Limited.

A. Lloyd and G. E. Barrett (Snowdonia Coaches), Quenington, applies for the Bibury—Cirencester service and excursions and tours from Bibury of F. G. J. Pritchett.

M. Charlton and Sons, Limited, Hexham (trading as Cecil Moffit), is applying for licences held by Cecil Moffit. These include stage services from Hexham to Bellingham and Acomb, and from Bellingham to Newcastle upon Tyne.

London Transport states that with the winter schedules on October 5, the Central area Sunday bus route 27A, Highgate—Hounslow Garage, will be withdrawn and 73 will be extended on that day to run between Stoke Newington and Hounslow. This change was originally to be included in the November 26-30 group of route alterations; 73 is thereafter to run daily to Hounslow. Also from October 5, Route 191 (Lower Edmonton—Chingford Hatch) is scheduled to be withdrawn on Sunday. A new Sunday route 102A will run between Golders Green and Chingford Hatch.

BRITISH ALUMINIUM IN COACHBUILDING

This 37-seater Panorama Pioneer* Coach was built on an A.E.C. Reliance Chassis by Plaxtons (Scarborough) Ltd. for Sheffield United Tours Ltd. British Aluminium sheet was used for all body panelling.

* Overall winner of the 1958 British Coach Rally, Brighton, and winner of the Grand Prix d'Honneur at the 11th International Coach Rally, Nice.

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GARDNER DIESEL

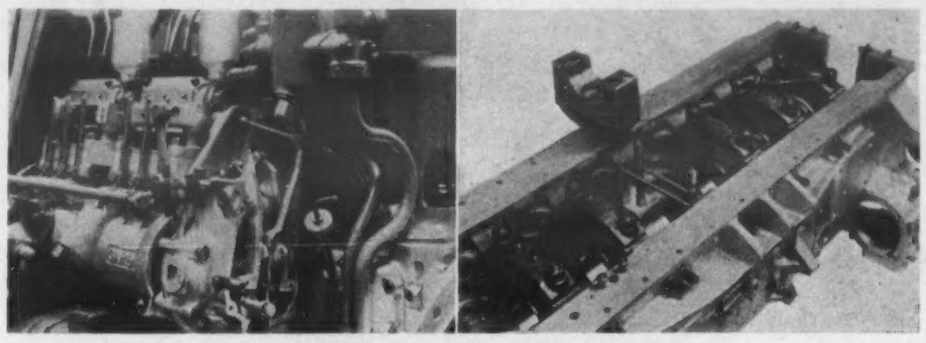
Six-Cylinder 150-b.h.p. Unit

OUTSTANDING SPECIFIC POWER AND CONSUMPTION

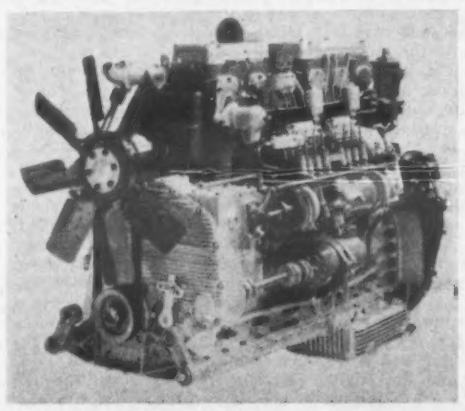
AN event of great importance to a number of British manufacturers of high-quality commercial vehicles was the introduction a few weeks ago of a new Gardner diesel engine. Designated LX6, the engine has an output of 150 b.h.p. and has been introduced to meet the growing demand for greater power not only for automotive purposes but also in railcar, marine and a variety of industrial applications. Examples of the 6LX which has low enough bulk and weight to be directly interchangeable as an installation with the Gardner 112-b.h.p. 6LW engine, are exhibited by Norris, Henty and Gardners, Limited, at Earls Court, where they also power goods and passenger vehicles shown by various manufacturers. The 6LX has 4¾ in (120.6 mm.) bore and 6 in. (152.4 mm.) stroke, giving a swept volume of 638 cu. in. (10.45 litres). Net output is 150 b.h.p. at 1,700 r.p.m. and 485 lb./ft. torque at 1,000 to 1,100 r.p.m.

In both specific power and specific fuel consumption the 6LX is outstanding, if not even unparalleled for engines of this class, and its specific bulk is also highly favourable. Complete with flywheel, the weight is about 1,580 lb., giving a weight-to-power ratio of 10.6 lb. per b/h.p., and its minimum specific fuel consumption rate is 0.33 lb. per b.h.p.-hr., which represents an overall thermal efficiency of 39.75 per cent. The maximum fuel consumption rate does not rise above 0.34 lb. per b.h.p.-hr. and if the engine is operated slightly below maximum torque at 900-1,100 r.p.m., it actually achieves over 40 per cent thermal efficiency. When this is compared with the 37½ per cent of the 6LW, itself a highly efficient engine, and with the 37½-39½ per cent of large marine diesels developing over 50 times as much power as the 6LX, in which high thermal efficiency is relatively easier to achieve, the standards of performance reached in the new Gardner engine can better be appreciated.

The maximum net output of 150 b.h.p. is developed at the relatively low governed speed for modern automotive diesels of 1,700 r.p.m. Before giving way to the temptation to criticise this setting on the ground that it necessitates more complex transmission arrangements to provide the wider range of road speed demanded of modern vehicles than do faster-running engines, a closer study of the whole performance of the 6LX is advisable. From the performance curves reproduced on this page it will be seen that there is only a 3 per cent reduction in torque output right down to 600 r.p.m., a factor which permits the use of a higher top gear ratio and a wider-ratio gearbox than is possible with engines having a peaky performance, however high their speed of rotation.



A view showing the mechanical governor case with covers removed and also the massive Gardner camshaft case for fuel-injection pumps; right, underside of the light-alloy crankcase with a main bearing removed to show the deep locating faces for the cap and its two cross bolts



The 150-b.h.p. Gardner 6LX with self-contained flexible mountings comprising patent links forward and a torque reaction member and hydraulic damper at the rear

Operational Latitude

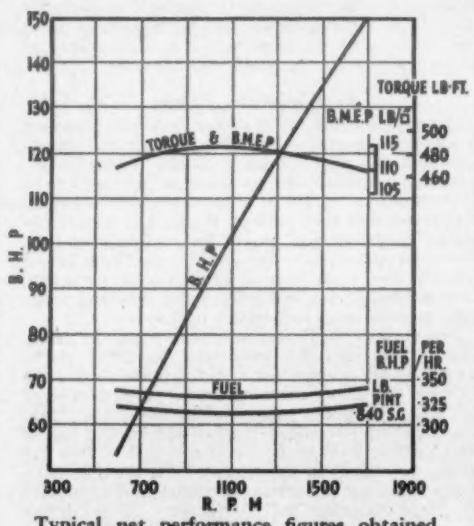
In fact, it is just such engines that need a multiplicity of gear ratios to give them an acceptable performance on the road and to enable the engine to be kept working near its optimum performance to preserve an acceptable fuel economy. With a correctly matched transmission employing the usual five or six gears, it is doubtful whether the 6LX-powered vehicle need give away anything in top speed to the average automotive diesel running at several hundred r.p.m. faster, while the almost flat torque and fuel consumption curves over the entire engine speed range will give wide latitude for the varying habits and capabilities of individual drivers without prejudicing road performance and fuel economy. Moreover, the moderate engine speed plus the advances in design and structure incorporated in the new engine will ensure for it reliability and durability in service at least equal to the LW engines, which customarily run for 300,000 miles, and often substantially greater mileages, before major attention is required.

Gardner engines enjoy the advantage that all the castings used in them are produced in the company's own foundries, thus ensuring that the closest control of quality can be maintained from raw materials to the finished product. The 6LX has a separate crankcase of high-purity aluminium alloy and cylinder block of special ductile high-tensile cast iron. The crankcase is of extremely rigid design with generous ribs inside and outside and an exceptionally deep vertical section that provides adequate support for each main bearing and ensures the minimum of crankshaft deflection and stress. Main bearing caps are cast in high-tensile aluminium alloy and are of great depth. They are fitted with girder-section forged steel bridges which spread the load from large high-tensile through bolts which secure the cylinder block to the crankcase, their lower ends then forming the main bearing cap studs.

Ultimate in Crankcase Design

Fitted across the crankcase and passing through all bearing caps but the one at the flywheel end are two transverse bolts per bearing. These are tightened from outside the crankcase to a loading of 3 tons against the deep cheeks of the bearing caps, providing a powerful addition to the rigidity of the bearing housings and general structure which appears to be just about the ultimate in crankcase design. The use of aluminium has saved some 300 lb. of weight over a conventional cast-iron crankcase, which however heavy could hardly be more rigid, while the high relative expansion and heat conductivity of aluminium permit small initial bearing clearance and the rapid dispersion of heat. The rear end of the 6LX crankcase can be fitted with varying types of endplate to suit particular transmission and mounting arrangements and the sump also, which is of magnesium alloy and can be extensively finned for heat dispersion, is available in a variety of forms.

Dry-type cylinder liners of a specially selected material are pressed into the cylinder block, which is also of very rigid design with ample water spaces. Large-diameter studs are numerous and evenly spaced close to the bores to ensure freedom from gasket troubles. Water passages between block and head are spigoted and sealed with individual neoprene rings, so that the steel-asbestos gasket has not to make water joints and surfaces do not suffer corrosion. Water jackets are accessible for cleaning through large-diameter cast-iron plugs.



Typical net performance figures obtained with the 6LX in normal production tests. The high b.m.e.p.-torque curve right down to 600 r.p.m. will be noted

Cylinder heads are cast in threes of high-tensile iron and carry two valves per cylinder, valve levers and fuel sprayers, which are secured by a single nut. Typical Gardner durability with low maintenance is assured by special hard alloy iron valve-seat inserts and special steel for the valves, of which the inlet is rather larger than the exhaust and carries a masked portion that, in conjunction with the designed shape of the inlet passage, provides the correct degree and direction of turbulance in the cylinder. Considerable research has led to the adoption of a new design for internal coolant passages to ensure the most desirable distribution for local and general heat extraction.

Valve Lubrication

The valve stems and pushrod ball ends are pressure lubricated through the hollow case-hardened valve lever shaft and passages drilled in the case-hardened valve levers. The amount of oil reaching the stems is closely controlled by flats machined on the levers, the oil feed holes being relatively large. This avoids the use of small metering holes which might be liable to stoppage. A decompressing lever on each head slightly lifts the inlet valves to permit hand cranking. The cylinder heads are fitted with shallow polished aluminium covers. The design of the heads is such that the cover does not require to make an oil-tight joint, thus removing a possible source of oil leaks and reducing maintenance requirements. The covers are fitted with neoprene grommets to provide dustproof seals at the point of entry of the fuel pipes.

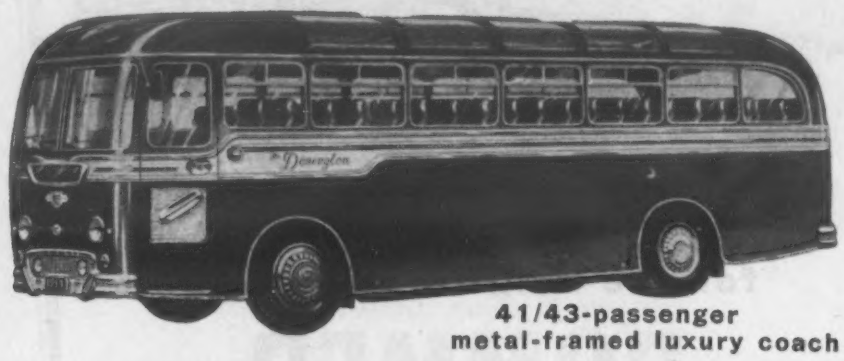
The pistons are of patented Gardner design and are cast in the company's own foundry of a medium-silicon aluminium alloy having a low coefficient of expansion and high wear resistance.

(*Continued on page 6*)

COMMERCIAL MOTOR SHOW

See the New
DUPLE COACHES
on Stands
43 & 44

THE 1959 DUPLE DONINGTON



41/43-passenger
metal-framed luxury coach

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ROCHESTER	High Street
FOLKESTONE	121 Sandgate Road

New Gardner Diesel Engine

(*Continued from page 5*)

Careful heat treatment, an incredibly high standard of dimensional accuracy and surface finish and a design evolved during years of development provide consistent and long-lasting physical properties resulting in small temperature and gas load stresses and a complete immunity from fatigue failure. The Gardner piston is of exceptional length, providing a large bearing area, and it is perhaps this feature above others that permits the use of only three piston rings—two pressure and one oil-control—and gives the low wear rates, quiet operation and low lubricating oil consumption over long periods for which Gardner engines are renowned. A hemispherical combustion chamber is formed in the top of the piston and the hollow floating gudgeon pin is retained by aluminium end pads.

The H-section connecting rods of high-tensile alloy steel die stampings are machined and polished all over and subjected to a 100 per cent flaw-detection inspection. The big-end cap is retained by two bolts and nuts and the rods are drilled through their length to provide forced lubrication of the small-end bronze bearings. Prefinished thin steel shells lined with specially surfaced copper lead form the big-end bearings.

The crankshaft is also machined all over to fine limits from a high-tensile alloy steel die stamping. It is not hardened in any way and runs in seven white metal-lined bronze shells and one roller bearing at the forward end. Every crankshaft is subjected to magnetic flaw detection at an intermediate stage in its making and in the finished state. The rear end of the shaft carries a large six-bolt flange for flywheel mounting and a triplex chain sprocket for camshaft and auxiliary drives as well as a V-groove pulley for the fan drive at the forward end; inside the crankcase is a simple friction torsional damper. Oil feed from the main bearings to the big ends is through steel tubes pressed into holes drilled across the shaft from journal to crankpin, this method avoiding angular pockets where sludge might accumulate.

Fuel Injection Pumps

The triplex-roller-chain-driven camshaft is carried in seven white metal-lined bearings in the crankcase and one roller bearing in the timing cover. Inlet and exhaust cams are made in pairs and fixed to the shaft by means of pointed setscrews, a form of construction that permits the cam profiles to be readily reground and stored for future overhauls. The cams operate tappets carried in cast-iron guides fitted to the crankcase and held in place by bolted clamps. Tappets operate the valve levers through light tubular-steel ball-ended pushrods.

The C.A.V. BPF fuel-injection pump is fitted, which type includes only the pumping parts, operated by Gardner cams and tappets giving the required injection characteristics. Two blocks of three C.A.V. pump elements are used and these are dowelled to a light plate fitted to the top of the cambox, so that a pair of serviced pumps can be quickly fitted to the engine. The Gardner fuel-pump camshaft is extremely robust and supported on large-diameter ball bearings. It is driven through a helical gear meshing with a similar gear on the valve camshaft. The fuel-pump gear is free to slide on a helical spline and is coupled by means of a yoke to the accelerator lever, thus varying injection timing automatically with engine speed. In addition to the ram return springs in the BPF pumps, each fuel-pump tappet is spring loaded and, traditionally, each fuel ram is provided with a separate hand-operating lever for priming and for testing the action of the sprayers without their removal from the engine.

Lubrication of the cambox, which also includes the governor, is by continuous circulation of a large volume of oil from the main pump. The cambox is positively located in permanent alignment with its drive, obviating the need for a flexible coupling and reducing backlash and noise to a minimum. The simple robust mechanical governor controls the engine at all speeds and its operating mechanism and connections to the injection pump are totally enclosed by a removable cover and automatically lubricated from the cambox.

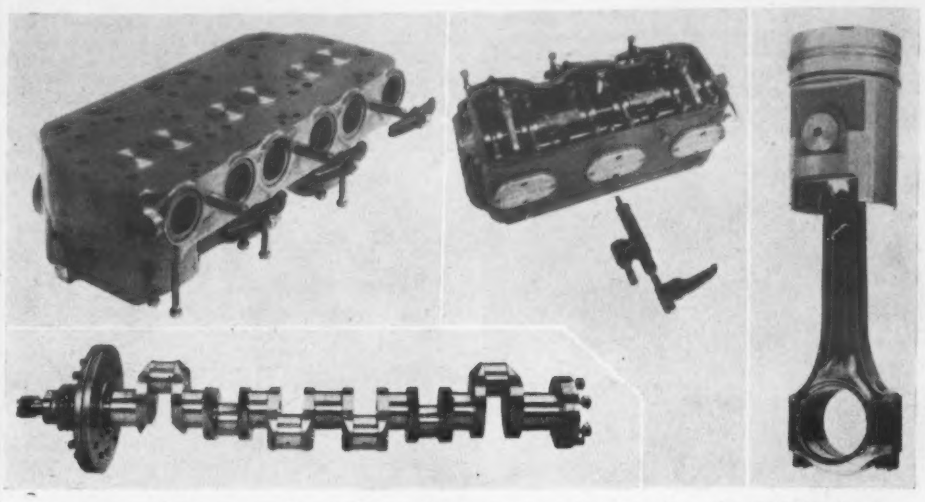
Various Services

Lubricant is circulated by a camshaft-driven gear-type pump and for operation at extreme angles from the horizontal a second pump can be embodied for returning oil from the low end of the sump to the oil-pump compartment. The engine is pressure lubricated as already described in paragraphs dealing with particular components, the pressure oil being taken from an external relief valve through a paper-element filter. Bypass oil from the relief valve flood-lubricates the injection-pump cambox, governor, timing case and exhauster before returning to the sump. The coolant pump, which is driven through an extension shaft by a gear on the valve camshaft, has a spherical carbon sealing gland and self-aligning impeller-spindle ball race. Circulation from the base of the radiator to the cylinder block and thence to the cylinder heads is controlled by a thermostatic valve, which causes the radiator to be bypassed during warming up. A 24-in. fan is V-belt driven.

Auxiliaries

Fuel feed can be by gravity or any lift system and when a lift pump is required a diaphragm-type unit can be fitted to the injection-pump cambox, when it incorporates paper-element filters on both the suction and delivery sides. When required, a Gardner piston-type vacuum exhauster can be incorporated and driven from the forward end of the valve camshaft. Provision is also made for mounting proprietary makes of compressor on the forward end of the crankcase for drive by V-belts from the crankshaft pulley. A 24-volt C.A.V. 6-in. axial-engaging starter motor mounted in cradles cast in the crankcase and secured by metal straps is a standard fitting when electric starting is specified.

The high thermal efficiency of the new Gardner engine means that it is working well away from the smoke limit, an important factor in these days when smoking diesel exhausts have been giving ground for complaints. Certainly, when we saw a 6LX operating on the bench at Gardner's works recently the exhaust remained completely clear while the engine was run up and down through its whole regime of speeds and loads. It was also extremely quiet and there was an absence of vibration under all conditions of running that we have not seen before in a reciprocating engine except perhaps in the Napier Deltic. Having seen the completed engine and examined its components and the standards of workmanship and inspection on the production line, we are satisfied that this new product of the company that pioneered the automotive diesel sets new standards of design and performance that will add fresh laurels to the name Gardner.



Components that go to make Gardner perfection: The combustion face of a cylinder head, each one of which is surface-plate checked; cylinder head with sprayer removed to show single nut fixing; extreme right, fully machined connecting rod and long double-taper piston that needs only three rings; and, below, machined-all-over crankshaft and torsional vibration damper

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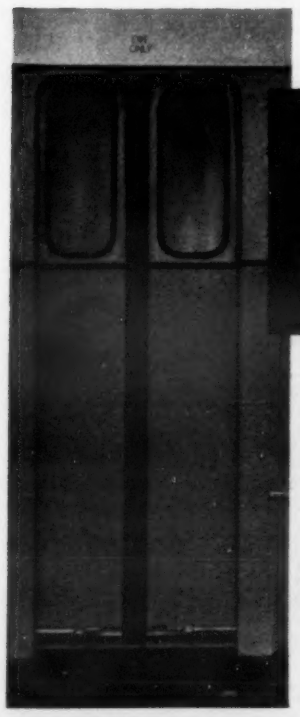

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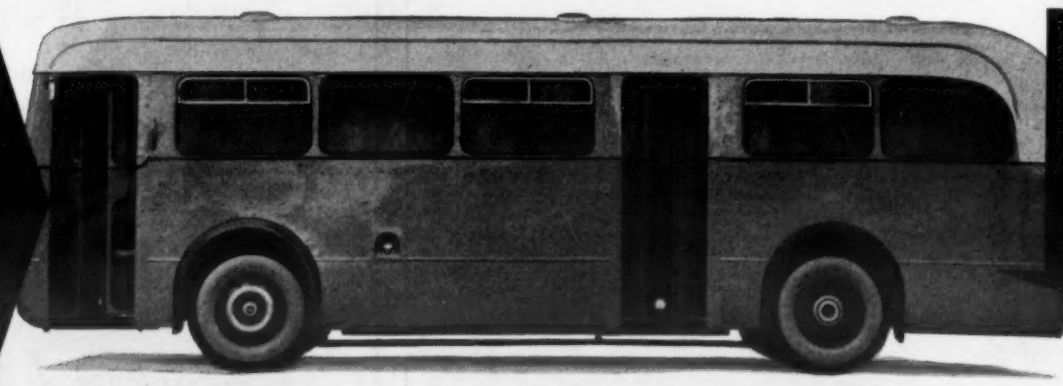

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THE TALGO TRAIN

More for Spanish National Railways

AFTER the government allocated money for the renovation and the reconstruction of Spanish National Railways, serious thought was given to new rolling stock and the possibilities of employing lighter trains that would give faster express services on long journeys. To do this, a train was required that would be light enough to be able to run over sections of the track that would be below the normal European weight. In addition to this, bridges that were capable only of taking low dynamic loading had also to be considered in view of the proposed high-speed running.

The Talgo train developed by the American Car and Foundry Company fitted these requirements,

Layout of Talgo car as seen at Brussels Exhibition

for it only weighed just over 112 tons complete with diesel locomotive and 14 carriage units. In addition to this, the railways could use it for a luxury service. In November, 1949, the first Talgo trains arrived in Spain and after going through a period of successful test runs, they were put into regular passenger service between Madrid and Hendaye on July 14, 1950. Since then they have been continuously on this route.

Engines

The Talgo units on the RENFE were built, as indicated, by the American Car and Foundry Company (A.C.F.). They are built in aluminium alloy. The locomotive is powered by two 405-h.p. Hercules diesel engines; in addition are two 170-h.p. Hercules diesel units for auxiliary services through the entire train. Fuel consumption is 11.8 litres a kilometre with an average commercial speed of 80 k.p.h. (50 m.p.h.). (The British main-line diesel locomotives, with heavy trains on express services, burn about a gallon a mile.)

One of the outstanding features of the train is that it forms an entirely articulated assembly; each carriage unit is carried on a single axle at one end and upon a central articulated joint, suspended from the previous unit in the train, at the other, the weight of the unit being picked up on the sidemembers of the previous car. Rubber facing smoothes the sides of the train.

More Ordered

RENFE at present has two Talgo trains, but as indicated in an article by the general manager, Senor Jose Puig Batet, in our September 13 issue, 11 more are now contemplated. There are two locomotives and 32 carriage units available at present, including a luggage van for the front and an observation car for the rear of each train. Usual formation is 14 cars, giving 160 seats, but 12 or 16 coach units are sometimes employed. Meal service is available at the seats, there being no special dining or buffet portion. Adjustable bucket-type seats, mounted in pairs, are employed. They have tray fitments to take the meals as served from the kitchen. Each pair of seats has a service bell. Hats and coats are collected and taken to the cloakroom car on the train.

A supplement is payable on the train, which is all second class; all seats are reserved and standing is not permitted. It is advisable for reservations to be made well in advance during the peak period of the year. Baggage, other than personal hand luggage, is not allowed in the passenger sections, but is stowed in the luggage compartment, where it is labelled with the destination of the passenger, the passenger having a numbered half of the label; this service is also included in the supplement.

Operating costs of the Talgo train with 14 carriage units, 160 seats:

Running costs (including staff, fuel and maintenance	27.93	pts. km.
Provision for sinking fund (locomotive, 10 years—coach unit, 20 years)	13.00	pts. km.
	40.93	pts. km.
Running costs—		
Per gross ton-km. hauled ..	.3900	pts.
Seat-km.	.1740	pts.

Operating costs of other services in comparison:

General running costs on (locomotive hauled trains in RENFE 1954 all lines and services)—	
Per gross ton-km. hauled steam	.2264 pts.
Per seat (first class 1,000 kg. per seat)—Steam	.2264 pts. (130 per cent)
—Electric	.1900 pts. (109 per cent)

Differences of speed, air-conditioning and services are also to be taken into account. Since the introduction of the Talgo train on the Madrid—Hendaye route, passenger traffic has increased, but it is difficult to discriminate if this is due to the introduction of the train or the increased tourist traffic to Spain.

For some time now RENFE has given serious thought and consideration to the question of weight of the Talgo train, which, if it could be reduced, would enable the running of trains on other routes, which would not take the train at its present weight, at high speeds. Plans are afoot to build the new Talgo trains in Spain, but with modifications so as to reduce the weight still further. As the locomotive weighs some 61 tons alone, it is quite possible that this will receive the greatest attention. So far it has been possible only to attain 80 per cent of the locomotive's brake horsepower. It is possible that the fuel oil used is of lower grade, but it is the only type available in the country.

In America it was not until early in 1956 that a United States railroad took delivery of a Talgo train from A.C.F. This began operating for the Chicago, Rock Island and Pacific Railroad between Chicago and Peoria (161 miles) in February, 1956. It had seats for 288 coach passengers and 20 parlour-car passengers in a combination unit with a dining-car. It cost $788,000 or $2,300 a seat, whereas a conventional train then cost some $3,800 a seat.

OUTDOOR FORK TRUCK

Added Virtues of Torque Converter Model

ONE of the newcomers to the range offered by Conveyancer Fork Trucks, Limited, is the TC yard model diesel fork-lift truck. While this latest model incorporates all the advantages and special features of earlier models in the TC range such as torque converter drive, special attention has been given in the design to the exacting requirements of outdoor operation. Wider wheel-track, larger wheels with consequent greater ground

Illustrates degree of articulation built into Conveyancer TC yard model diesel torque converter fork truck

clearance and articulated rear axle ensures four-point ground contact and stability under the most arduous conditions.

Earlier models in the TC range, first developed six years ago, are in operation in all parts of the world, in conditions varying from the Arctic to the tropics. This truck was the first in the world to incorporate torque converter drive and its success is proved by the fact that many major ports throughout the world are now equipped with Conveyancer TC fork trucks, in Canada, Australia, New Zealand, Norway, South Africa, India, Malaya

(*Continued at foot of next column*)

and others. In the face of possibly the most severe world competition ever experienced, Conveyancer recently secured an order for the supply of 36 of this series of truck to the port of Rangoon. Conveyancer TC models are also standard equipment aboard Royal Navy aircraft carriers.

BRISTOL REORGANISATION

Effect of New Bus Station

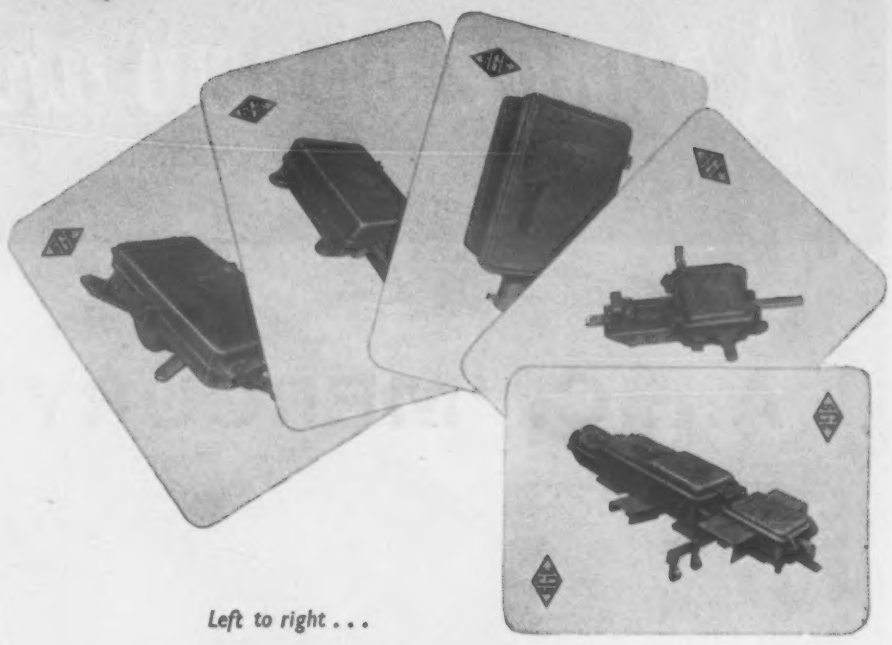
CONFIRMATION by the Western area Traffic Commissioners has now been given to the proposals of the Bristol Omnibus Co., Limited, for the reorganisation scheme in Bristol which was approved in principle on September 1, as already recorded in MODERN TRANSPORT. The changeover took place on September 21. Mr. T. D. Corpe appeared for the company and evidence was given by Mr. W. W. V. Williams, the company's divisional traffic superintendent.

On Saturday, September 13, the company started the distribution with tickets issued to passengers of 100,000 leaflets explaining the extensive changes and re-routeing of city bus services which were taking place. The leaflet includes a rough plan of the centre of the city showing the whereabouts of the new stopping places and the services which use them. The revision is linked with the transfer of all country services to the new country bus and coach station at Whitson Street, off Haymarket. Previously they terminated at The Centre, Prince Street and Narrow Plain. Revision of the city services also provides more cross links around the periphery of the city and links new housing estates with the new Broadmead shopping area, which adjoins the country bus station. Last city service buses now leave the central areas at 11.30 p.m. on weekdays and 11 p.m. on Saturdays—half an hour later than before.

New Parcels Service

A new parcels service was introduced on September 22, for country routes of the Bristol company and the associated Bath Tramways Motor Co., Limited. Some 300 agents have been appointed in towns and villages. Parcels may be handed to the conductors direct or left at the offices. The charges are 1s. up to 7 lb.; 14 lb. 1s. 6d., and 28 lb. maximum 2s. Any parcel may be accepted providing it is not of a size to inconvenience passengers or cause obstruction. A push-chair loan service on Mondays to Fridays has been inaugurated at the new bus station, chairs having to be returned by 5 p.m. on the same day. This facility has, of course, been operating very successfully at Bath.

SGE diamonds are trumps...



Left to right . . .

HA Separate Point Machine

HJ Point Detector

HL Dual Point Controller

HF Lock and Detector

HB Combined Point Machine

. . . a nap hand

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LONDON TRANSPORT 'changed here' to

BIRMABRIGHT

Travellers on the Piccadilly Line can now see in operation the new "all-silver" prototype train built by the Metropolitan-Cammell Carriage & Wagon Co. Ltd. for London Transport Executive. Nearly eighty of these trains are to be ordered, and they will go into service first on this line.

The whole exterior is in light alloy, the end pressings as shown in the photograph being in Birmabright BB.3. The train is left unpainted, which means a big saving in maintenance costs. A further considerable economy arises from the reduction in dead weight effected by the use of light alloys.

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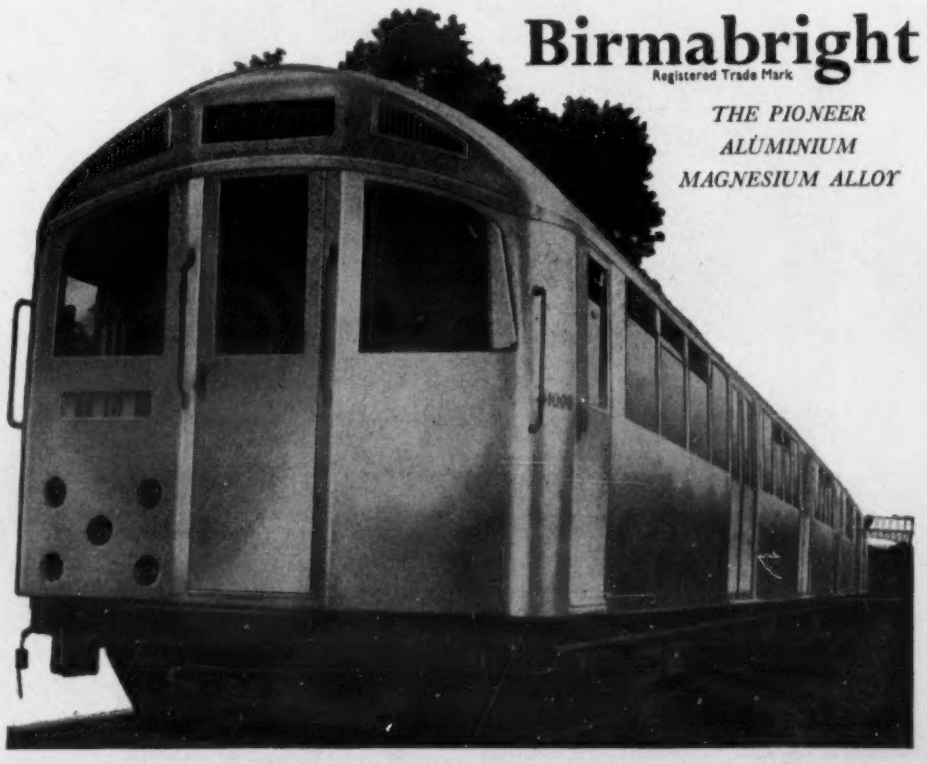

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What Commercial Vehicle Users Want

Passenger Transport Industry Looks to the Future

By S. KENNEDY, M.Inst.T., Chairman of the Tilling Group Management Board

MY thoughts on future developments which the passenger transport industry might reasonably expect from chassis and body builders are tempered by my dual business interests, which lie on "both sides of the fence" because I am closely concerned with both the manufacturing and operating sides of the industry.

But looking at this question entirely from the operators' point of view, there seem to be a number of desirable and reasonable objectives that should be attained in time.

Passenger Comfort

As passenger comfort is likely to become an increasingly important factor in an already highly-competitive field, much more thought might be given to improvements which directly affect the passenger. Ventilation and heating, for example, are two matters which seem to require more efficient treatment, especially between the extremes of summer and winter. Engineers have exercised much of their ingenuity on heating problems, and there is surely an excellent opportunity for vehicle designers and heating engineers together to apply the knowledge gained in other fields to a solution of problems specific to the road passenger industry. Complete air-conditioning is no doubt the ultimate answer, but there is plainly scope for wider research towards meeting this problem in a less elaborate way.

As insulation is closely associated with heating, one may also look for improvements in this respect, not only thermally but in the reduction of extraneous noise. It is true that we are living in a noisy age, but that does not mean that we should accept this as an excuse for leaving the problem where it is. I was much impressed by a recent journey on a long-distance train in France on which there was a sleeping-car which had been specially treated with sound-absorbing materials. Walking through the train, which included a restaurant car as well as other sleeping-cars, one could not fail to notice the reduced noise in the corridor of the specially-treated coach. In a railway coach the noise comes mainly from the track, but there is the same kind of problem in a public service vehicle, in which the chief requirement is a reduction in engine and transmission noise.

Coach Interiors

There are some other respects in which I think coach interiors could be improved. First the standard of lighting seems to be a little behind the times, taken alongside the marked advances which have been made elsewhere. Secondly, seating and interior finishes could be better, with more imaginative use of some of the new materials now available. Tastes in colour are always changing (although not always in the right direction), but there is no denying that furnishing materials and their complementary colour schemes can make or mar the interior of a vehicle. Finishing materials have been so much extended in recent years that I feel that often it would be wiser to make more use of professional advice.

I must also suggest that there should be some new arrangement of the driving position on coaches used for pleasure travel. No passenger should be expected to sit and look at the driver's back—they should all be given a clear view ahead. This is all very well in theory, of course; in practice it seems to mean moving the driver "up" or "down." Both ways have been tried, but the solution is plainly not yet to hand.

Battery Design

To my plea for better lighting I would add a hope for some new method of storing electricity. The consumption of electricity on public service vehicles has increased enormously, and will continue to do so. The lead-acid and nickel-iron batteries have had a very good innings—particularly the former—but I think the stage has been reached when we might expect a complete change which will give increased capacity with less weight.

Alternatively, or even additionally, we might look for some reduction in the demands of current-consuming devices.

Together with improvements in interior comfort there should surely by now be some advance in springing. Leaf springs have been with us with relatively little change since the horse carriage. Happily, there are signs of new ideas, such as air suspension, which are encouraging because I believe that a radical change is overdue. Improved springing, together with another desirable feature, an infinitely-variable-speed gear, should give our customers a really comfortable ride. I feel that an infinitely-variable-speed gear is needed because we are gradually moving towards the equivalent of the diesel-electric or petrol-electric drive. In addition to giving a smoother ride, it would also save wear and tear on the whole vehicle. But I should expect this type of transmission without any appreciable lowering of present mechanical efficiency.

Both initial costs and maintenance would be reduced if it were possible to develop a metal for coachwork which would not require exterior painting yet at the same time would still present an agreeable appearance. There is nothing new in this idea which has been tried by various operators in several parts of the country. Previous experiments have mainly incorporated aluminium panels but with only varying degrees of success. Particular difficulty has been encountered in coastal areas where corrosion is a big factor. If the scientists would like to have a target, I would suggest a metal with the characteristics of stainless steel but with the weight of aluminium.

No Limit

There is virtually no limit to the extent of improvements which one could list without regard to the practical limitations of attaining them, but it is also true that in this atomic age it is impossible to forecast what remarkable changes may be in store. What may have been quite impossible yesterday may be accomplished tomorrow, for there is little doubt that surprising new possibilities are just "around the corner." If, as operators, we may look innocently into the crystal ball of atomics, we shall hope to foresee (perhaps quite unreasonably!) a prime-mover occupying less space, and of less weight and fuel consumption, than our present engines, yet delivering more power. In other words, we want our bread buttered on both sides, and along the edges as well! And why not?

These views are quite personal and have been set down at random. They are not necessarily in order of importance; they are certainly not intended to form the basis of a specification for a 1959 vehicle replacement programme!

Some Pre-Show Thoughts on Long-Distance Goods Vehicles

By W. L. MORGAN, M.I.Mech.E., Chief Engineer, British Road Services

WHEN contemplating the forthcoming Commercial Vehicle Show, and considering the design developments which one would like to see in connection with the heavier class of vehicle for long-distance and trunk operation, it becomes necessary to assess the relative advantages of the rigid and the articulated vehicle for this type of work, under present conditions and those likely to prevail in the future.

Interchangeable Semi-Trailers

There are indications of growing popularity of articulated vehicles—that is to say, a vehicle consisting of a motive unit and a quickly detachable self-supporting, interchangeable semi-trailer. The design of a really satisfactory articulated vehicle, particularly of the heavier type for long-distance work, poses additional and more complicated problems than does that of an equivalent rigid vehicle. Lateral and longitudinal stability, axle-load distribution and weight transfer, steering geometry, braking characteristics and "jack-knifing" and "rear skidding" phenomena are some of the more important interacting features which require careful design to achieve the optimum compromise. It may be that a full realisation of all the problems involved in the heavier class of articulated vehicle has been somewhat retarded by the manner in which this type of vehicle has developed. Until recently a minority have been designed as complete entities.

There appears to be little benefit in articulated vehicles for long-distance services unless these services are organised to gain the full advantage offered by the ability readily to interchange semi-trailers, thus keeping the motive units at work while semi-trailers are waiting or being loaded and unloaded. Such an organisation postulates the provision of two, three, or even more semi-trailers for each motive unit, for there is little virtue in the use of articulated vehicles on normal long-distance work if they are operated with one semi-trailer as if they were rigid vehicles; in fact, there are distinct disadvantages because, not only are the design problems more complicated and critical, but the articulated vehicle is normally heavier than the rigid vehicle of comparable capacity.

Special Bodies

It thus follows that, in a general haulage articulated fleet, complete interchangeability is of great importance; not only the ability physically to couple any motive unit to any semi-trailer, but also standardised braking, steering and "handleability" must be maintained as far as possible, irrespective of the individual semi-trailer coupled. Further progress by manufacturers towards standardisation of brake actuation, size and pressures, motive unit and semi-trailer wheelbase, axle-load distribution and location of point of superimposition would thus be welcomed.

In addition to regular long-distance haulage there is a further field in which the interchangeable semi-trailer is valuable; where specially bodied vehicles—hoppers, tippers, tankers, etc., are required for seasonal or intermittent work. In such cases only the semi-trailer need be laid up when not required for service, and the motive unit can be kept at work. Where power is required on the semi-trailer—for a pump, blower or for tipper actuation, etc.—it is often desirable to provide a small i.c. engine for this purpose, so that the semi-trailer equipment is completely self-contained, and can thus be operated with any standard motive unit. This type of special purpose equipment may therefore repay some study.

In B.R.S., experience has indicated the advantages of articulated vehicles both for properly "artic-organised" services and for other suitable duties, and the proportion of such vehicles in our fleet is increasing. We are thus particularly interested in technical development tendencies in relation to this type of vehicle.

Scope for Improvement

Among the more important design features in which there is considerable scope for improvement are those relating to suspension and to brakes.

The difference in load applied to the semi-trailer axle or axles, from the unloaded to the fully loaded condition, can be in the order of 1 to 10, a greater variation than is likely to be encountered in rigid

(*Continued on page 11*)

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The position of the driver of public service vehicles is one of the points dealt with by Mr. Stanley Kennedy on the opposite page. In this Spanish coach the driver is raised into the roof, above the eye level of the passenger

vehicles. As the forward end of the semi-trailer is carried on a coupling free to articulate in all planes, the desire for a greatly improved rear suspension system becomes apparent. One of the attributes of an ideal suspension system would be its ability automatically to adjust itself to suit any load variation in the range, at the same time maintaining adequate lateral stability and resistance to roll. It may be that some form of air or air-hydraulic suspension will ultimately go a long way towards giving the answer; while a great deal of work is already being done in this connection, much still remains to be done. It is hoped, therefore, that designers will continue to direct their attention to improved suspension, particularly for semi-trailers.

The brakes of heavy vehicles also offer much scope for technical improvement. The relatively high performance of the modern goods vehicle, coupled with ever more onerous traffic conditions, makes increasing demands on the brakes. High drum surface unit-pressures achieved by the use of power-operated braking systems increase difficulties inherent in the conventional brake shoe-drum arrangement, not the least of which is the problem of heat dissipation, which now causes some concern, inter alia, by the amount of heat transmitted to tyres. The disc brake may well offer some advantages in this direction, but here again much work remains to be done in the case of heavy vehicles. It is hoped that it will not be too long before some really significant braking system development becomes manifest—there has been a long period in which only minor improvements have evolved.

Effect of Loading Variations

In the case of articulated vehicles, the difficulty of obtaining effective and controlled braking is enhanced by the variation in axle loadings previously mentioned. The semi-trailer tyre adhesion in particular presents a great problem because of the extreme variation in loading, and the retardation achieved in this axle has a substantial influence on the retardation of the vehicle as a whole. A step towards the ideal braking system for a heavy articulated vehicle, therefore, would be means whereby the braking force in each wheel would be automatically proportioned to the load imposed on it, without involving complications of such magnitude as to render the system uneconomic or unreliable. Such an ideal will probably never be fully realised with braking methods at present in use, but any substantial advance towards it would be acceptable.

In any discussion of design features, the power unit usually takes pride of place, but this is far too complex a subject to be dealt with in these brief notes. It is generally agreed that the modern road diesel engine is a fairly satisfactory job, but long-distance operators still seek improved fuel economy, reliability and engine life, together with a little more power for hills, and higher acceleration, and signs are not lacking that progress is still being made in these directions.

The power/weight ratio of the heaviest class of normal solo vehicles has tended to increase over recent years: not long ago the majority had a ratio in the order of 5 h.p. per ton but now there are indications of an increasing move to at least 6 h.p. per ton.

Other Criteria

This ratio, calculated from peak b.h.p. and gross vehicle weight, while a convenient index for rough comparison, is not of course the sole criterion of optimum engine performance for a vehicle of 24 tons g.v.w.: increased peak b.h.p. by increased maximum r.p.m. will not necessarily achieve an improvement in performance—except on those very rare occasions when full-load full-speed conditions prevail—or an improvement in vehicle average fuel economy. Indeed, in the latter respect, the reverse is quite likely to be the case.

It will be interesting to observe, therefore, if continued improvement will be achieved on the lines of larger capacity slow-speed engines—the size only limited by weight and space considerations—adjusted to operate a little below maximum b.m.e.p., and also whether further research on the turbocharger has a contribution to make here.

Constant Acceptable Performance

With this rather over-simplified comment the subject must be left at present, except perhaps to remark that engine performance calculations and hypotheses are normally based on the new engine in test-bench condition, whereas in the case of a long-established fleet of regularly maintained vehicles, the average engine condition is half-worn, and there are, at any given time, as many engines doing their last few thousand miles of life as there are new-condition engines doing their first few thousand. One further requirement is thus for an engine which can give a constant acceptable performance—not necessarily peak performance—over its whole life, and remain capable of being kept smoke-free to the end.

View from the Cab

In conclusion, perhaps one may be forgiven for riding an old hobby: visibility from the driver's cab. Many of the larger goods vehicles on the road today have high cab scuttles and sides which greatly restrict the driver's view, particularly to his nearside front. While this may be little disadvantage when driving along the main road, the long-distance driver also has to negotiate heavy town traffic, where "close-in" visibility is, to say the least of it, desirable.

Visibility from the driver's cab is generally good in modern bus and coach design, and it is difficult to understand why the heavy goods vehicle, which operates under conditions no less difficult than those of the long-distance coach, has not received more attention in this respect. One hopes therefore that the 1959 Commercial Show will provide evidence of an increasing appreciation that the best possible all-round and "close-in" visibility for the driver of a goods vehicle are desirable features which justify every effort to achieve.

For the Distributive Trades

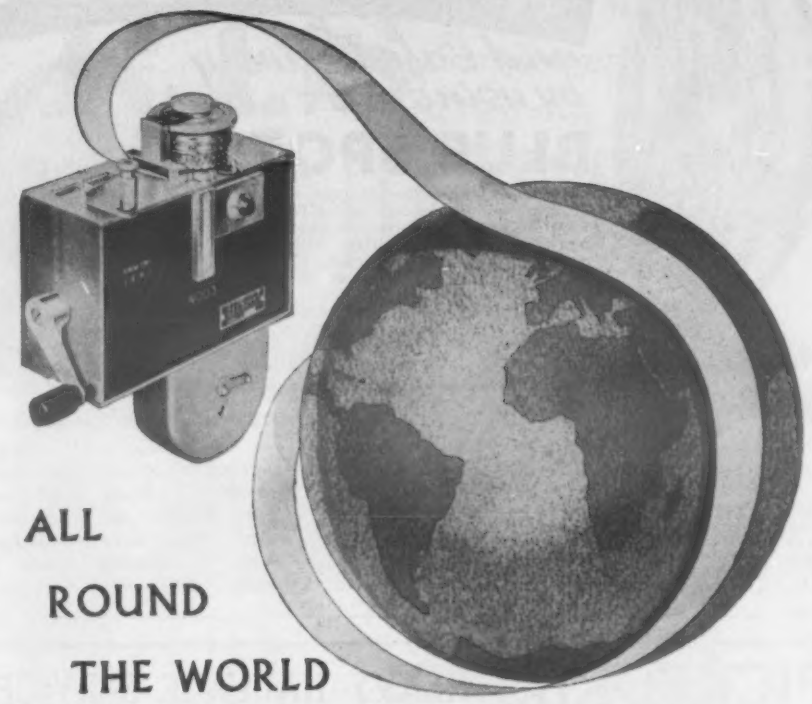
By A. PRENTICE, Transport Manager, St. Cuthbert's Co-operative Association, Limited

Delivery by the front door of the St. Cuthbert's type of van saves opening the rear doors in busy thoroughfares and so promotes safety; right, the customer can see the whole display of food at eye level. The salesman on retail work by day can use front or side door according to weather or circumstances; the vehicles are double-shifted and carry out wholesale deliveries at night

FOR a number of years now we have been compelled, for want of a suitable design available on the market, to convert many of our vehicles in the 1- to 1½-ton class to meet our everyday requirements in Scotland in the service of the St. Cuthbert's Co-operative Association. The illustrations shown will perhaps give readers a clearer view of our experiments than mere writing would convey.

We really set out to "knock at the manufacturer's door," so to speak: a specification which we published in an article in *The Co-operative Review* as long ago as 1934 shows that this is no impulsive notion as to what we think the design of a distributive vehicle should be. We consider that the high cost of distribution in this and other countries warrants a more realistic approach to the problem and we are in no doubt that a suitably designed vehicle would make a sensible contribution towards that end. The cost of distribution has its impact on the ordinary wage earner, perhaps

(*Continued on page 27*)



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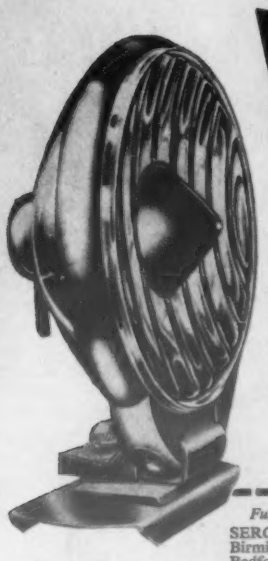

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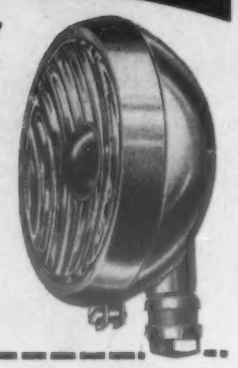
See (left) the 'Nearlite' Wide Angle Fog & Driving Lamp. 2½ in. deep, 5¼ in. diam., available with or without micromatic adjustment, £3 14s. & £3 8s. respectively.)



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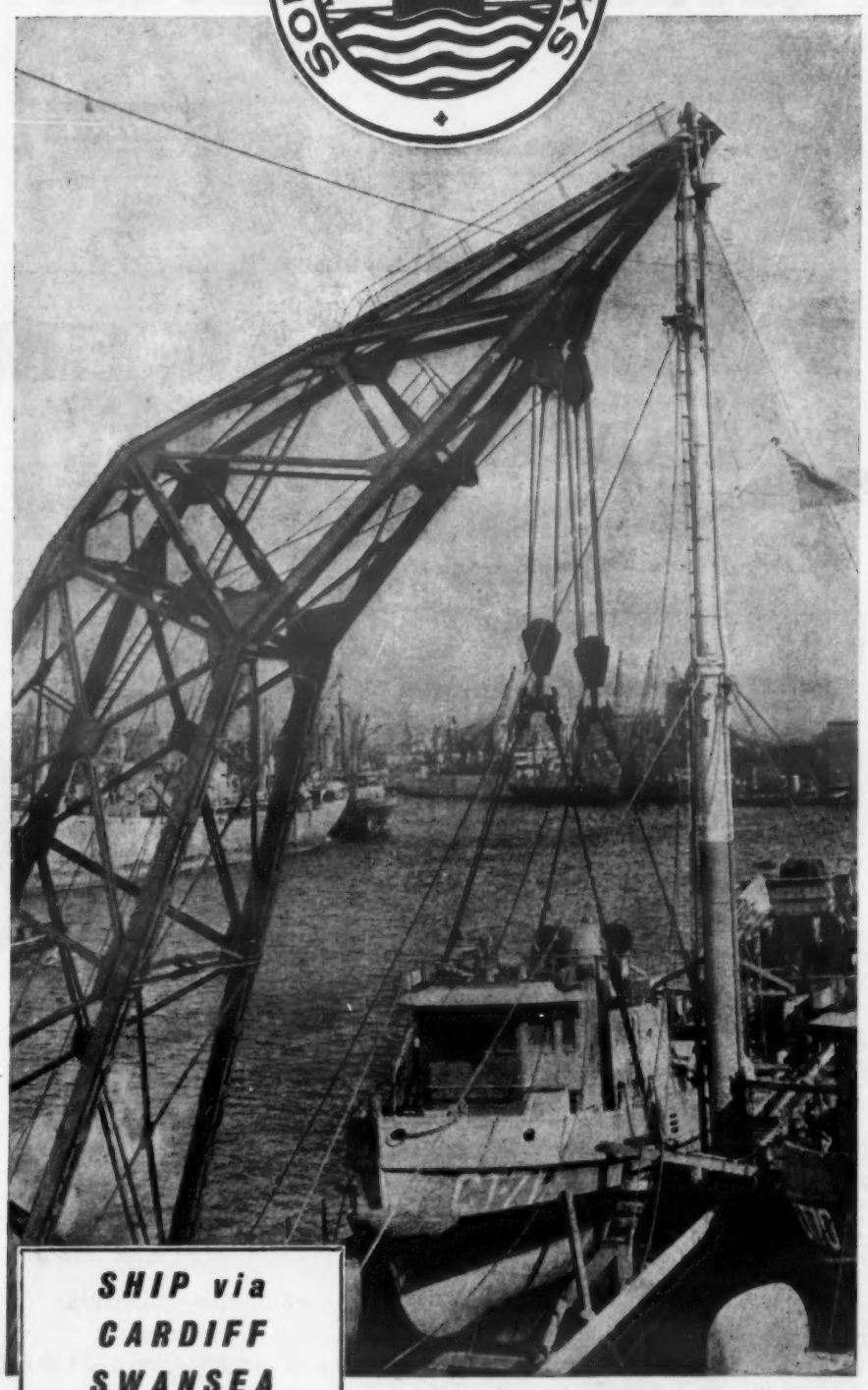

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BRITISH TRANSPORT DOCKS

TRAINING LOCOMOTIVE ENGINEERS

Facilities Are Improved But There Is More To Be Done

*By ROBERT ARBUTHNOTT, M.B.E., T.D., President, Institution of Locomotive Engineers**

I HAD the privilege of serving my time in a large locomotive works and of spending some three to four years in most of the usual shops and in the drawing office but very little actual instruction as such was provided and I recollect that I learnt disappointingly little during this period beyond elementary aspects of locomotive workshop technique and of design. I did get the feel of machine tools as well as of workshop atmosphere and industrial life in general and gained a closer personal acquaintance of the locomotive itself, all of them most valuable experiences, but unsatisfying. It was presumably up to me to make what use I could of the facilities provided. Some preliminary instruction would have been a great help as the necessary background information was not always readily available from one's fellow-workers, despite their obvious desire to help. I believe such instruction is still lacking in certain works.

Since my apprenticeship days there have been many changes in the methods used in selecting and training young engineers of all grades and such factors as careers masters, works visits and mechanical aptitude tests have been introduced in an endeavour to eliminate "square pegs." For example, the embryo trade apprentice, instead of being put on production work at the age of 14, straight from school, now has the advantage of a further year there followed by a year's pre-apprentice training at a works and at the employer's expense, thus not starting his apprenticeship proper till the age of 16. This preliminary year at a works can, and should, be most valuable for the prospective tradesman, helping him not only to adjust himself to industrial life by easy stages but also to obtain a much wider and more intelligent understanding of engineering principles in general.

Teachers Needed

This extra year's schooling reminds us, however, of the urgent need for additional teachers. The view has been expressed that unless industry seconds technical men as instructors in mathematics and science, these subjects will have to be struck out of the syllabus. Obviously something must be done in the atomic age, when already the human brain can scarcely cope with the complexity of modern scientific problems. We, however, are more immediately concerned with the engineering apprentice and the sandwich or the post-graduate trainee and I have mentioned the trade apprentice and his pre-apprenticeship training only because I wish to stress the importance of a good beginning. While spoon-feeding is not desirable it is important that the comparatively short time available should be used to the best advantage and not wasted through lack of guidance.

I wish here to emphasise the great value of the practical part of an engineer's training and the need to acquire some personal skill in at least a representative selection of the various trades. The ability to use tools correctly creates a sense not only of satisfaction but of authority which cannot be achieved by the mere watching of others at work. There is, I feel, a case for the more frequent use of tests to establish standards of proficiency. I would also like to stress the importance of understanding the basic principle behind whatever one is studying. It is no use making notes or acquiring a copy of some document as an aide-memoire if one does not understand it to start with. I say this in the light of experience with very keen and enthusiastic overseas trainees some of whom are noted copyists.

University

Perhaps a word is appropriate as to the most advantageous age at which to start university or other specialised academic training. There are differing views on this; on the one hand it is suggested that the young man should go straight from school to the university or technical college course whilst still in step with the routine and discipline of normal school life and with a mind attuned to book learning; on the other hand, others feel that a more intelligent approach is made to the theoretical work when the experience of a year's industrial life points to the practical value of the theories being studied and links them to obvious later requirements.

My own view, with which I find considerable agreement amongst my young engineering friends, is that the year in industry is an invaluable prelude to university life. The graduate, coming to the shops for his fuller training some time later, picks up the practical side much more quickly than his younger counterpart by reason of a more mature and critical brain and a greater confidence which increases his ability to assess problems as well as to find their solutions. Wherever or whenever it is undertaken, however, really conscientious attention to the academic side of the training is necessary. "B.Sc. failed" is not a sufficient qualification in today's job market.

Effect of National Service

In Britain the intervention of national service has in the recent past been a serious interruption in the normal life of the young engineer. A valuable feature of the training period was its broadening effect on the general outlook of every national service candidate, but the fact remains that from the narrower angle of engineering training it was a wasted period. Happily this disruption of life, which was necessary in the national interest, seems to be coming to an end but I hope, instead, that there will be keen support for the Territorial Army and I would like to see increased use made by those young men who no longer undergo compulsory national service, of one of the movements or organisations such as Outward Bound, which encourage self-reliance and endurance. An additional course for men of 18-23 years of age has now been arranged by the Outward Bound Trust.

Whatever branch of engineering we may consider, and modern trends are accentuating this, specialisation is necessary at some stage to meet the exacting technical requirements of the particular field of development with which we are concerned but I believe that basic training should be as comprehensive as circumstances will permit, at least in the early days, so as to lead to a more intelligent specialisation later.

Booked for a Job

It is perhaps worth noting that the position is now arising where university students of any reasonable standing are virtually booked by future employers before they have completed their first term and sometimes even immediately upon leaving school. One wonders whether this may not tend to destroy the traditional conception of university life, which is to enable the graduate to develop a broad outlook rather than the specialised one of the man "who only knew facts." The university, particularly the residential type, where one practises the art of living, was never intended merely as a superior technical school. Industry requires as its leaders men of wide vision, wide understanding and high moral quality as well as of technical excellence.

The ever increasing contact between industry and the universities is a notable example of the realisation which firms in general have of the need for highly trained men and we must see that the locomotive engineering profession in its widest sense is not left behind in this competition for available brain power allowing the best men to be enticed into other professions. Moreover, in view of the shortage of candidates the position should be watched to see that this valuable commodity is not squandered on positions which could be filled satisfactorily by students of higher national certificate standard instead of those with degree qualifications.

Is Our Aim Correct?

Before leaving the question of post-graduate training it is interesting to consider whether we are still aiming correctly and to contrast the older established methods with, for example, an interesting experiment undertaken some time ago by a well-known firm in England which felt that the capacity and standard of ability of the university-trained student was underestimated. It was suggested that in order to understand the operation of, say, a general machine shop or tool room, it was not necessary to work personally on all the different machines for a specified period. Instead, the graduates worked in pairs and were given definite assignments, one graduate preparing a report on their joint observations and findings, the other delivering it to the whole group. No specific departmental training periods were laid down and the students moved on individually as soon as they had absorbed all that was considered necessary. This type of training has, of course, to be supervised carefully to see that the graduates are kept on the job all the time but supervision is essential, whatever the scheme, if satisfactory results are to be obtained.

There is also the oft-asked question as to whether the best training comes from the large or the small works. I would only say that the former obviously has greater facilities and more to teach in large-scale production methods and in the use of jigs, fixtures and special equipment on a basis which could not be justified with a small output, but there is also something to be learnt from the comparatively small, eminently versatile and enterprising firms many of which have a technique and character all of their own. In them everything is more of a personal affair and individuals have to be more self-reliant in overcoming daily problems. The very lack of large sized orders demands skilled improvisation and the personal designing and making of tools and equipment—and often machines too—where others can afford to buy, and trainees too may well have opportunities for personal practical experience on a wider basis than is possible elsewhere. Experience of either or of both sizes is therefore valuable.

Place of Economics

I would recommend some experience of processing, planning and rate-fixing and if possible some contact with the cost accountant's department. I would stress the importance of an economist's outlook on all works problems and an acceptance of the works cost accountant as one of the team and not, as is so often the case, as an enemy or a spy! It is not by accident that the Institution of Mechanical Engineers includes an economics paper in its examination syllabus. The shortage of technically trained engineers mentioned earlier is a serious problem and, from a purely domestic point of view, I suggest that we must take definite steps to foster and encourage such young engineers as we have and make life attractive for them here in Britain, albeit without discouraging those of pioneering spirit who wish to make their way elsewhere in the Commonwealth.

Status of the Engineer

The engineer—and the locomotive engineer is no exception—has all too long been denied the social and professional status which he merits. It is encouraging, therefore, to know that the general public seems to be realising that modern life with all the features and conveniences now considered a normal and indeed an essential part of it would be impossible without the inventive genius and untiring efforts and services of engineers. Water, food, fuel, power, transport—even conditioned air—have now to be enginered and laid on.

It is the day of the scientist and the engineer and increased financial as well as professional status is greatly overdue even though, in part compensation, their life is enriched by the inherent interest of their work; an interest which can surely not be available to those professions which are entirely non-creative. Much of the prosperity of this country has been built up on heavy and medium engineering, of which locomotives are a worthy example and I hope that the modern tendency to glamorise light engineering will not react unfavourably on these other vitally important branches of the engineering profession. The locomotive has an aura of romance which should give us a good start.

*Abstract from presidential address before the Institution of Locomotive Engineers, September 17.

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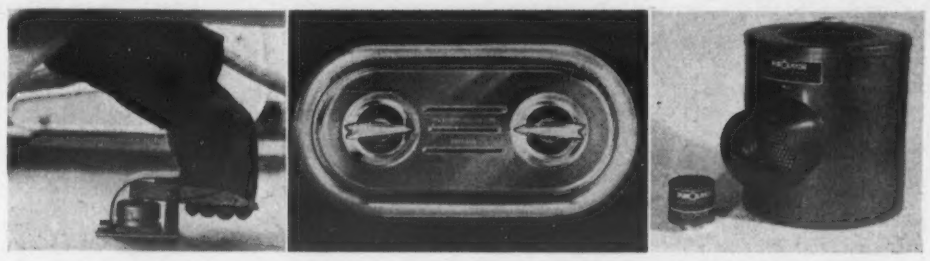
COMPONENTS AND ACCESSORIES

Novelty in Wide Range of Products for Commercial Vehicle Industry

IN the following paragraphs we review and in some cases briefly describe some of the vast number of components and accessories on the stands at Earls Court. As is usual at motor shows, a number of the items exhibited in the gallery are new and not yet generally incorporated in the vehicles on show but in the main they represent current production components and their exhibition provides visitors with the opportunity of examining more closely than is possible in a completed vehicle and of discussing with manufacturers' representatives some of the thousand-and-one parts that go to make up the modern commercial vehicle.

Washable Micronic Filter

Automotive Products Co., Limited, on **Stand No. 372** and its associated companies **Borg and Beck** Co., Limited, and **Lockheed** Hydraulic Brake Co., Limited, on **Stands No. 359 and 362,** introduce a number of new items in their respective ranges. Automotive Products has on show a new range of Purolator large-capacity air filters of the Micronic paper-element type in sizes for air flows of from 20 to 550 cu. ft. per min. This type of filter for intake air has now gained wide acceptance with engine makers and operators. The company also shows for the first time a new washable Purolator Micronic filter suitable for crankcase or hydraulic reservoir breathers. Thompson steering rod assemblies featuring automatic wear compensation, as used by many manufacturers, are joined on the stand by a further contribution to fewer calls on maintenance—a new spherical joint with bearing surfaces of dry lubricant-impregnated fabric that requires no lubricant throughout its life designed for auxiliary and remote controls.

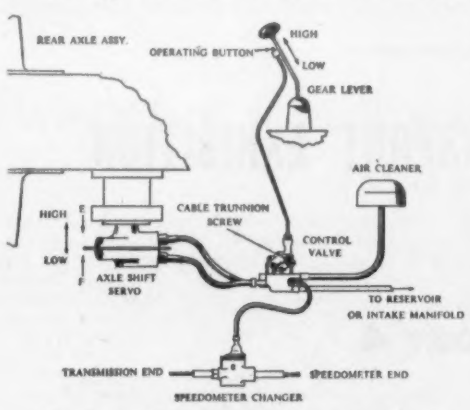


Trigger release and safety catch under driver's seat for releasing coupling hooks on Scammell new Mark II automatic coupling gear; Weathershields anodised interior baffle and plaque for control of Flomatic roof ventilator; extreme right, smallest and largest of a new range of Purolator paper-element air filters

New on the Borg and Beck stand are a 6½-in. dia. clutch, which is designed for small commercial vehicles and fills a gap in the 6½ in. to 18 in. current range, and a 14-in. AS-type strap-drive clutch to add to the existing 12- and 13-in. units. In the AS design, drive is transmitted from the pressure plate to the cover through four pairs of spring-steel straps in such a way as to preserve accurate balance throughout the full range of lever travel and to eliminate rubbing contact between pressure plate and cover. A complete range of rigid and spring centre driven plates is also shown.

New Lockheed Brakes

Three new types of brakes are exhibited on the Lockheed stand, a heavy-duty cam-operated brake for vehicles of 14 tons gross upwards, a development of the disc brake for commercial vehicles and a drum-type commercial vehicle transmission



Diagrammatic arrangement of new Lockheed vacuum controls for two-speed axle

brake. The cam brake is 15½ in. in diameter in widths from 4½ to 7 in. with ⅜-in. thick linings. Both leading and trailing shoes are fully floating and individual adjustment for each shoe is arranged externally. Each shoe is mounted on spherical-ended struts to reduce friction and the cams incorporate hardened steel heads shaped to give constant lift through the life of the lining. A novel means of retaining the shoes permits their removal without disturbing the pull-off springs.

The new disc brakes are available in single- and double-cylinder form and with a variety of cylinder bore sizes to give complete flexibility of front-rear braking ratio. The brake design incorporates automatic adjustment of a positive clearance between the friction pads and the disc, internal fluid passages in the caliper instead of external pipes and quickly removable pads through an aperture on top of the assembly, through which pad condition can also be inspected at a glance. The new drum-type transmission brake 12 in. in diameter and 4 in. wide is for vehicles of 10 tons g.v.w. Another new Lockheed product on show is a complete set of controls for a vacuum-operated two-speed axle.

Automatic Taxi Transmission

Although there are no applications yet in production commercial vehicles apart from marginal types developed from private cars, many visitors will be interested in the display on **Stand No. 373** by **Borg-Warner,** Limited, of that company's compact automatic transmissions. Displayed are complete and sectioned transmissions and component parts and a mock-up of the new Austin FX4 taxi-cab driving compartment (a complete vehicle is shown on the Carbodies stand) which is scheduled to incorporate the Borg-Warner unit. The company also shows torque converters, free-wheel clutches and various Morse chain drives and couplings.

Of great interest on **Stand No. 68** is the **Brockhouse** Mark IV development of the tractor portion of the company's Interchangeable semi-trailer coupling. The new unit, which is designed for use with Brockhouse Interchangeable, Scammell MH, Tasker DS and Hands G semi-trailers, incorporates improvements in well-established automatic coupling features with easy positive operation and more efficient trailer braking in a clean design simple to install in the tractor chassis. The major features, which have been patented or are the subject of patent application, are hydraulic uncoupling through a simple ram powered by a hand pump in the driver's cab, incorporating safety features to prevent inadvertent use; a micro-switch-operated warning light in the cab that stays on until coupling hooks are fully engaged; use of hydraulic trailer brakes powered by Clayton Dewandre Hydrovac using the inverted vacuum principle; and a hand lever in the cab to control trailer brakes independently through the Hydrovac.

High-Torque Gearboxes

Evidence that the need for proprietary transmission units suitable for use with the higher-powered engines that have been available for some time has been noted and is being met is to be found on **Stand No. 240,** where the **David Brown** automobile gearbox division shows a number of new gearboxes, the majority designed for use in extra-heavy vehicles. Among the units shown are five-speed and 10-speed boxes (the second being basically the five-speed unit coupled to a built-on two-speed epicyclic range changer) for a maximum torque of 750 lb./ft.; a new 480-lb./ft. unit designed for use with the new Gardner 6LX diesel engine; a two-speed transfer box developed for the 90-ton Atkinson Omega tractor (which employs the S.C.G. semi-automatic eight-speed unit as primary gearbox); and a three-speed unit designed as a range changer in the E.R.F. 50-ton capacity articulated quarry vehicle.

Cabs suitable for these large specialist vehicles are shown on **Stand No. 349** by **E. G. Brown** and Co., Limited, which can produce a variety of individual types of single-place cabs without special tooling. One of these cabs is shown with swinging and sliding doors on opposite sides, illustrating its suitability for either type, and with the standard feature of emergency doors at the back of the cab. The company also displays a conventional forward-control cab designed for export vehicles, front cowlings and panels for passenger vehicles, an insulated double-skin end of a large-capacity road tank sectioned to show its construction and a number of examples of the company's deep press-work and welding, including welded monel metal.

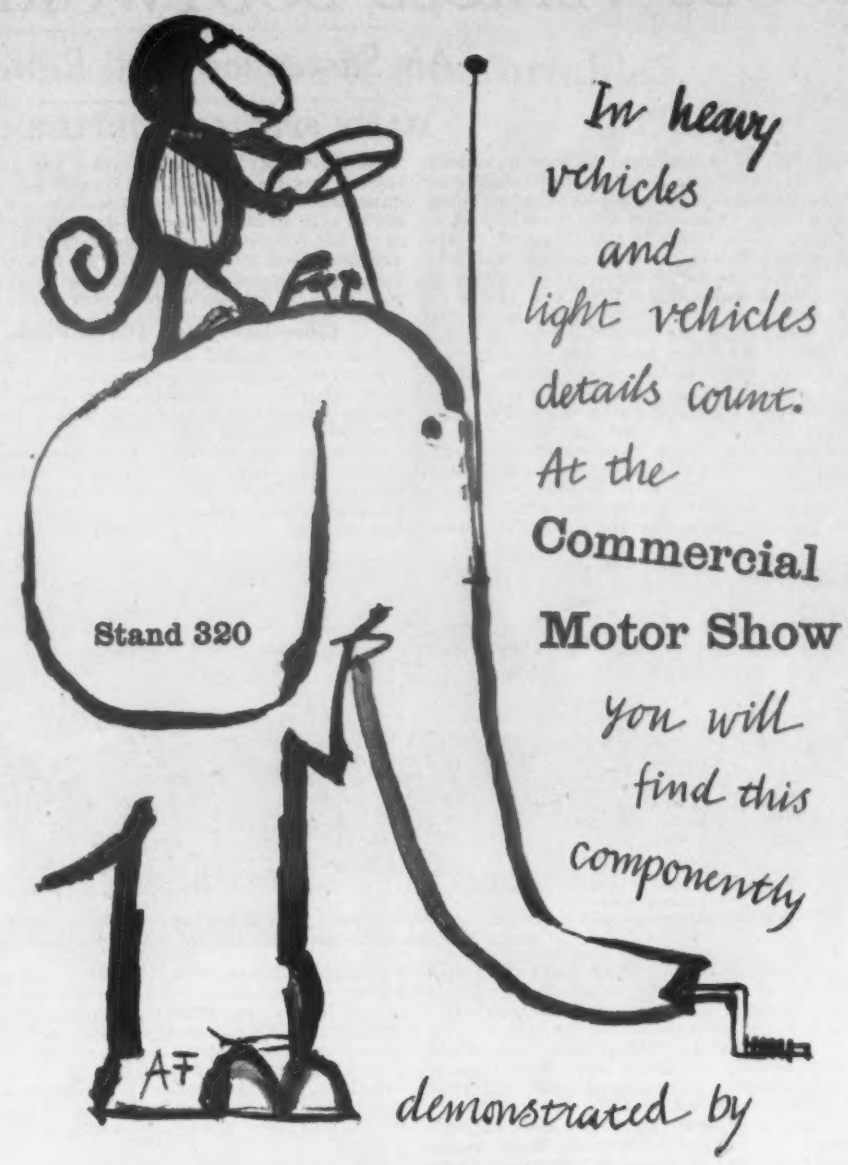
New strap-on rear load lamp by Lucas

Cape Asbestos Company, pioneer of moulded brake linings in this country, on **Stand No. 284** has an impressive display of **Capasco** friction materials, which are fitted as original equipment by A.E.C., the Leyland group, Vauxhall Motors and others. Drum-brake linings, disc-brake pads and clutch facings are shown and a special section of the stand features the Capasco Lockheed and Borg and Beck replacement services which come into full operation this autumn.

New C.A.V. Items

On **Stand No. 248** a full range of established **C.A.V.** fuel-injection and electrical equipment is displayed as well as a new and cheaper type of axial-engaging starter motor and the C.A.V. fully automatic gearchange control for epicyclic gearboxes. The new CA45 Co-Axial starter is 4½ in. in diameter and has been developed to provide a relatively cheap unit with the advantages of axial engagement. Only the pinion (instead of the whole shaft) moves axially into engagement, partly through the action of a solenoid mounted co-axially with the shaft and partly through a helix cut on the shaft and pinion. The new auto-

(*Continued on page* 20)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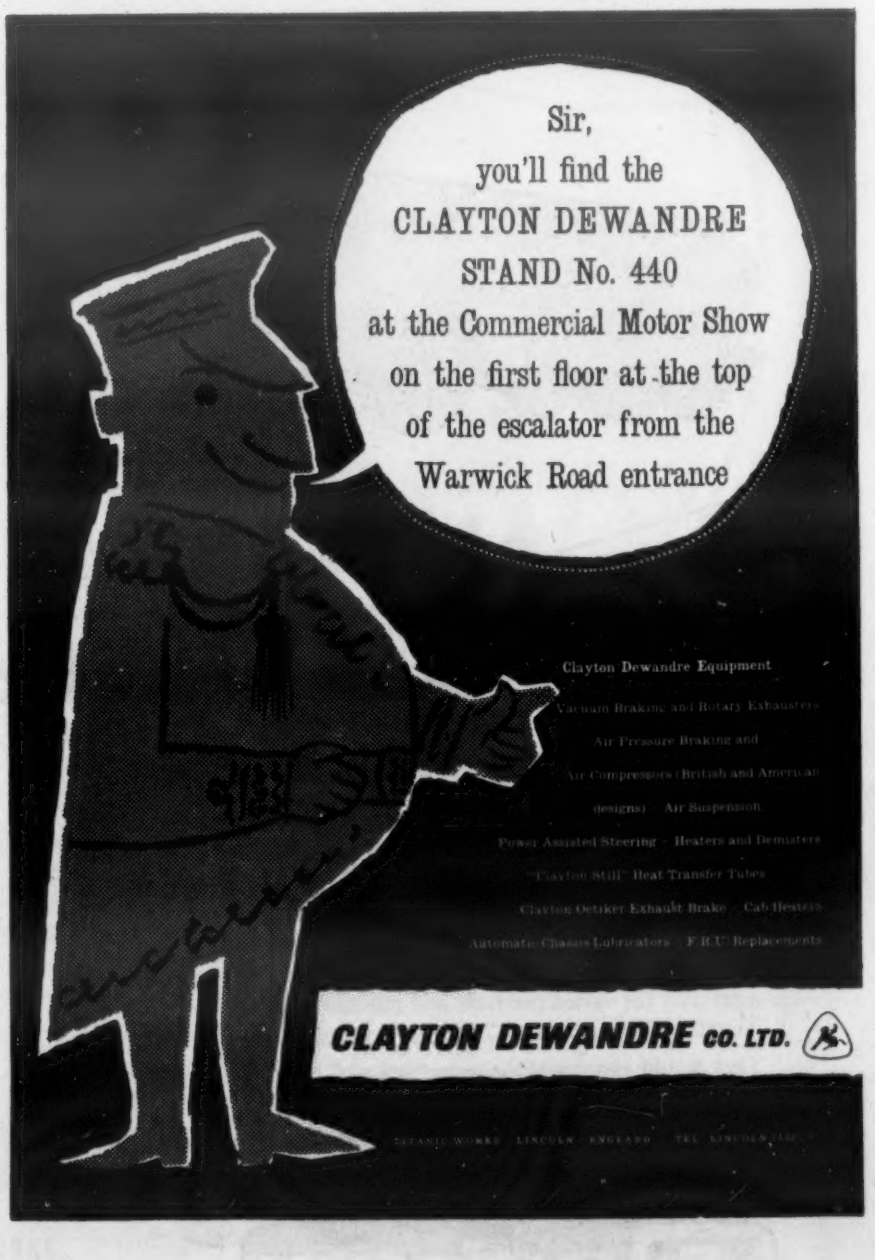
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GOODS VEHICLE BODYWORK AND TRAILERS

Air Suspension Well Represented

MANY SPECIAL PURPOSE UNITS

BODYWORK as applied to commercial vehicles will exhibit this year at the Commercial Motor Show advances and technical ingenuity meriting study no less close than that devoted to the chassis upon which it sits. Typical of the development which is going into the bulk transport vehicle is the detachable 260 cu. ft. container on view on the **Bonallack Stand No. 26.** This is an easily removable blown discharger class of container, destined for the Ketton Portland Cement Co., Limited, and seen fitted into an 8 cu. yd. tipping body on a Dodge 3144Y chassis, which thereby produces a dual-purpose vehicle.

The container, an Argonarc-welded aluminium structure 11 ft. 6 in. long by 5 ft. 6 in. wide, is located in the tipper body by means of conical self-aligning feet. It has two manholes for loading and the Wellworthy Ricardo Mark IV blower unit will, it is claimed, elevate cement to a height 60 ft. above ground, discharging the entire 8-ton load in approximately 20 min. The container weighs 5½ cwt. Also seen on the Bonallack stand is a 16 ft. 6 in. long light alloy boxvan body on a Thornycroft Swiftsure chassis for the Atlas Express Co., Limited. Dekaloy ribbed alloy floor planks are incorporated. Bonallack now offers tankers, and a 4,000-gal. seven-compartment mild-steel spirit tank is exhibited.

Examples of all-metal, light alloy and composite bodywork are featured by **Spurling Motor Bodies** on **Stand No. 69.** A Scammell 6-ton drop frame semi-trailer is seen with a boxvan body the two-level floor of which is of smooth-finished Dekaloy. There is a glass fibre Vanlite 12 ft. by 4 ft. translucent roof panel. The panelling is light alloy sheet, left unpainted on the exterior. The 25-35 cwt. all-metal van body is exhibited in cut-away form.

Typical of the output of **Arlington Bodybuilders** are the high-capacity Luton-type van and bakery van seen on **Stand No. 30** and the demonstration park. The 1,740 cu. ft. light alloy Coronet Mk. III van on a Bedford SB8 chassis is light alloy built with similar floor. Loading height is 3 ft. 2 in. and interior length 24 ft. excluding the 4 ft. 5 in. Luton extension. The new Albion Chieftain chassis is shown with an all-alloy double-dropside body. One of the two commercial vehicle exhibits of **B. Walker and Son (Stand No. 102)** is a Thames 3-tonner carrying a composite pantechnicon body on welded steel framing, unladen weight 2 tons 17 cwt.

Colour-Impregnated Plastics Panels

Colour-impregnated moulded plastics panels in cab and bodywork construction are a feature of the show this year. **Locomotors,** on its **Stand No. 23,** has an example in a light-alloy framed body for Sketchely Cleaners and Dyers on a Morris-Commercial long-wheelbase 3-ton forward-control chassis. The plastics exterior panels are bonded to the alloy and hardwood framing and the interior is plastics-covered hardboard to facilitate dust and dirt removal. The roof panel is a one-piece translucent glass fibre moulding, but alloy roof sections are incorporated to support hanger rails for clothing carried in the van. **Wadham Brothers** has a new ambulance body on the Morris-Commercial LD01 chassis, on show on **Stand No. 50,** which is panelled entirely in reinforced plastics. A double-skin technique, with a number of integrally-moulded metal inserts for location and fixing, is employed; the restyled front end includes a wrap-round windscreen.

Composite Construction

An example of **Marshall Motor Bodies** production is the boxvan exhibited on a Thornycroft Swift chassis **(Stand No. 121).** It is a composite body, the side panels being of Flexometal secured to the framing with Aerolite glue. Aluminium foil flashing is employed to exclude water from panel edges. The roof is a complete reinforced plastics moulding. Flexometal panelling is used also in a confectionery display van on a Bedford 2-ton chassis. Pegboard is used internally for the display of the manufacturer's products.

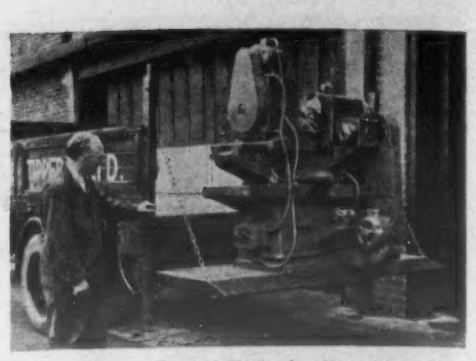
Tipping bodies are now offered by **Holmes (Preston)** in structural plastics; an example on a Foden chassis—the cab is a plastics product also—is double skinned, applied to Homalloy light alloy sections **(Stand No. 54).** Homalloy light alloy bodywork is exemplified by a Maudslay flat platform vehicle for Lincolnshire Canners, Limited. It has a skirted body, serrated floor and corrugated headboard. The cab is again a plastics product. This body is 18 ft. long and 8 ft. wide. A special brewery vehicle floor is made up of treadplate reinforced with deep corrugated alloy sections. This vehicle has a plastics skirting to its platform body.

Added mobility is given nowadays to industry, especially in the public works contracting and service industries, by the ubiquitous caravan in office guise. Sprite caravans, manufactured by **Alperson Products,** of Newmarket, today serve not only the private owner but also the commercial user. Caravans in the latter range are built to users' requirements and include mobile canteens, reception units, offices, shops, medical and dental units—in fact anything for which mobility and protection from the elements are essential. Two examples are seen at Earls Court on **Stand No. 114.**

Tankers

A **Darham Industries** 4,000-gal. capacity mild steel petroleum spirit tanker on **Stand No. 130** is mounted on Dyson Aeroride air suspension running units and vertical lift semi-trailer landing gear suitable for attachment to a Scammell Highwayman tractor. The inside of the tank is shot-blasted and lined with Epikote and the pipelines are tinned.

Tankers for fuel oil, milk and concentrated ammoniacal liquor are exhibited on the **stand (No. 123)** of **W. P. Butterfield.** The 3,250-gal. ammoniacal liquor tanker is a frameless Scammell-type semi-trailer. The single compartment stainless steel tank is designed for filling through a 12-in. rubber-aproned aperture at the forward end, with safety and vacuum valves and discharge is effected by air pressure supplied by a radial air compressor driven from the tractor take-off, the rear outlet funnel having a 6-in. bore. The tank is designed for a working pressure of 20 p.s.i. The milk tanker is a 1,750-gal. unit destined for bulk collection from farms, and is mounted on the new Albion Clydesdale chassis. An insulated stainless steel Fibreglass lagged tank section is shown mounted on a Dyson air suspension single-axle assembly.



The Edbro—B. and E. hydraulic tailboard loader in action

An example of the **Dyson** Aeroride tandem axle air suspension semi-trailer appears on the manufacturer's **stand No. 103.** This model is now well established in the U.K. market but for the Earls Court exhibit disc brakes have been added. These are directly operated by diaphragm-type air cylinders actuated by a standard twin-line air-pressure braking system; the trailer handbrake applies to one pair of brakes. Also seen on the Dyson stand is an 8-ton independent trailer equipped with bellows-type air suspension, the axles being located on rubber-bushed trailing arms and on Panhard rods. This trailer is also fitted with disc brakes actuated by an air over hydraulic system. Dyson hydraulically operated semi-trailer landing gear, arranged for either hand or power operation, is also on view.

Articulated P.S.V. with Air Suspension

Two examples of model W.1107 12-ton four-in-line semi-trailer appear on **Stand No. 112** of **British Trailer Company.** These are flat platform and van bodies; model W.4163, a stepped-frame variant, is also represented. In the demonstration park an

Albion Caledonian as a 4,000-gal. tanker, equipped with steam-heated coils; Albion Claymore CL.5N 4-ton underfloor-engined van with Normand bodywork; the A.E.C. 11.3-litre Dumptruk for a Scottish user; both plastics cab and light-alloy platform body on this Maudslay Mercury are of Homalloy manufacture

19th International

COMMERCIAL MOTOR TRANSPORT EXHIBITION

Earls Court

September 26 – October 4

DARHAM INDUSTRIES (LONDON) LTD.

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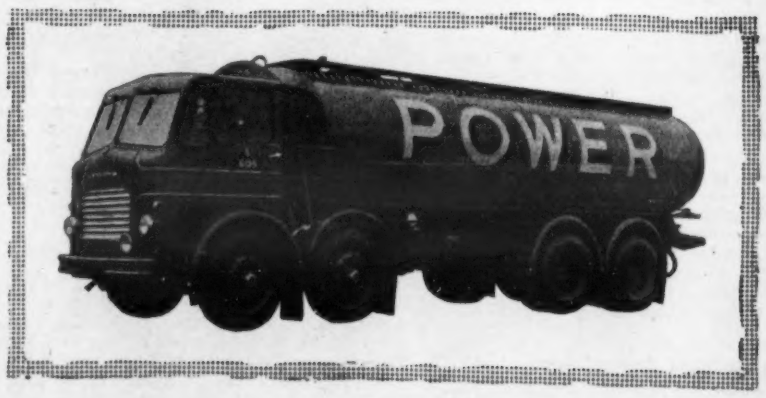
STAND NO. 130

where they are exhibiting a number of road tanks embodying the latest advances in design relative to payload, suitability for varied products and mounting technique, including "air suspension."

They would appreciate the opportunity of answering all your questions on these and other important transport tank developments.



Darham

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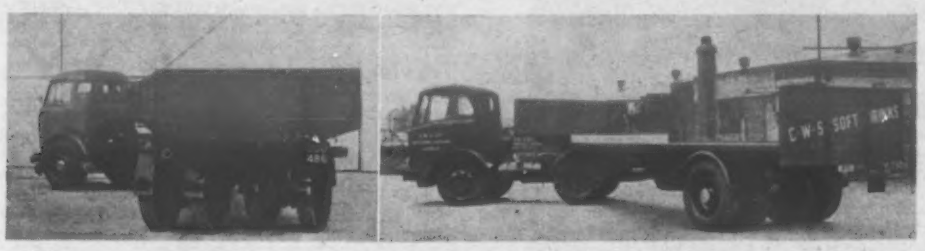
Works: Basildon, Essex, and Durham City.

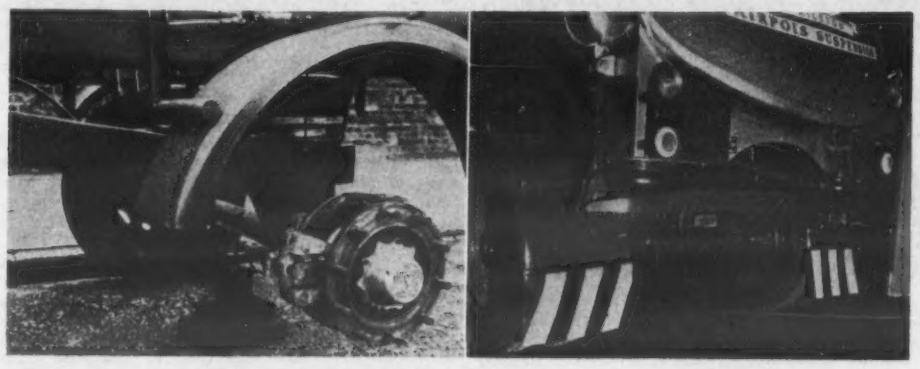
articulated passenger vehicle hauled by a Thames Trader tractor unit will feature air suspension on the semi-trailer and trial rides will be arranged for those interested. The products of **Cranes (Dereham) (Stand No. 106)** are the subject of a special article which commenced in our last issue.

A rear-end steering semi-trailer outfit is seen on the **Taskers Stand No. 104.** The design of this 12-ton 24-ft. long semi-trailer is such that the steerable real wheels are operated by relative turning movement between prime mover and semi-trailer, imparting true tracking and thus simple negotiation of corners. The side by side oscillating axles are mounted on semi-elliptic springs and the supports for each spring are carried on a ball-bearing turntable, the two turntables being connected by a track rod. The semi-trailer can be used with any prime mover having a standard fifth wheel attachment. Control is effected by means of the kingpin and a spring-loaded tapered block on the trailer which engages with the "Vee" opening of the tractor fifth wheel coupling. The angular movement between prime mover and semi-trailer is transferred by linkage to one of the turntables and thence to the other by track rod. Connecting and disconnecting differ in no way from normal fifth-wheel procedure.

A Taskers 15-ton straight frame semi-trailer with SAE coupling has canister type air suspension. Two oscillating axles swivel on beams pivoted at their forward ends on rubber bushes and controlled at the rear by the air springs with hydraulic dampers and levelling valves. The new Taskers D-S (double-safety) coupling for use with Scammell-type tractors is represented on a 10-ton semi-trailer. Included in the **Brockhouse** exhibits on **Stand No. 68** is the Mk. IV interchangeable coupling gear.



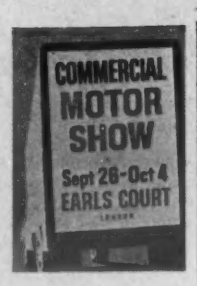
Taskers rear-steering 24-ft. long semi-trailer attached to Commer 12-ton tractor; right, the B.T.C. model W.4163 12-ton step frame four-in-line semi-trailer coupled to a Dennis tractor



Trailing arms and air bellows suspension units, together with disc brakes, are fitted to all wheels of the Dyson 8-ton independent trailer; right, disposition of air bellows, shock absorbers and Panhard rod on a Thompson Brothers (Bilston) single-axle tank semi-trailer

Tipping Gears

Pilot Works will have on display for the first time (on **Stand No. 116**) its new model H.20 fully power-returned high-speed dumper gear which will be fitted in conjunction with an all-steel and dumper body of approximately 12 cu. yd. capacity on an Atkinson six-wheeled chassis. This tipping gear has a tipping angle of 72 deg. and is fully powered all the way both ways. The gear is controlled from the cab by a new Pilot control valve which has four positions, namely "power up," "power down," "hold" and "float." On an Albion Caledonian eight-wheeled chassis model U.7 18-ton twin ram underbody gear and a 23 cu. yd. lightweight alloy end tipping body has the unusual feature that, in order to reduce overall height and to increase stability, it is fitted with an interlaced steel underframe. A Leyland Comet six-wheeler with 12-ton twin ram underbody tipping gear incorporates a folding type fabricated steel plate stabiliser. The third axle is a Hendrickson unit.



New Tailboard Loader

A new type of tailboard loader has been introduced by **Edbro—B. and E. Tippers** and uses a hydraulic motor, powered by an Edbro swash-plate pump, to rotate twin chain sprockets through worm gearing. The sprockets drive roller chains located within the tailboard lifting columns. Heading the list of **Anthony Hoists** exhibits **(Stand No. 41)** is 14½ cu. yd. welded light-alloy tipping body on the Albion Caledonian chassis. The new Anthony HT8 gear on this vehicle incorporates a double extension hydraulic ram operating indirectly through a linkage and it is stated that this linkage provides a lifting thrust from the cylinder while in its initial horizontal position; also contributing a substantial degree of stability during lifting.

On **Stand No. 53, Telehoist** shows an example of the Telelever 70-deg. link type tipping gear applied to a 6 cu. yd. steel scow-ended body on the Commer CD715 chassis. This is a power return system. On a Dodge 3144Y chassis is seen a 6 cu. yd. dropsided tipping body, a feature of which are hinges for the body sides concealed in a specially shaped sill. This eliminates any projecting parts. Various examples of its tipping gears for loads between seven and 12 tons are on **Stand No. 27** of **Spenbrough Engineering.** They include a 14 ft. 6 in. long body mounted on a Dodge chassis fitted with the Primrose third axle.

Passenger Coachwork at Earls Court

(*Continued from page 3*)

reduces the seats from 76 to 68. Inside the show again there is the Park Royal 70-seat trolleybus on a B.U.T. two-axle chassis for Glasgow Corporation **(Stand No. 88)** and, reverting to the demonstration park, there is a Roe dual-purpose 41-seat composite body for Gillett Brothers (Motor Services), Limited, on an A.E.C. Reliance chassis. Included in the exhibits of **Plaxtons** (Scarborough), Limited, on **Stand No. 48** is a 41-seat Consort IV body on a Bedford chassis; a similar vehicle appears in the demonstration park.

Small and Large Buses

Since **B. Walker** and Son, Limited, took over the bodybuilding work of the Grosvenor Carriage Company it has pushed ahead with the Grosvenor luxury personnel carrier based on the Bedford CA van. One of these appears on **Stand No. 102** as does the new 12-seat service bus on the diesel-engined Karrier 1½-ton chassis. All the seats face forward and access is by a sliding door at the front of the vehicle.

The **Willowbrook** body on a Dennis Loline for Walsall Corporation **(Stand No. 38)** is of particular interest as incorporating the chassis version for front-entrance bodies. This 70-seater also has a straight staircase rising in a forward direction from the platform—a layout which has been warmly advocated in various quarters on grounds of increased safety. Other exhibits include a very neat 31-seat one-man bus on an Albion Nimbus chassis for operation by the Devon General Omnibus and Touring Co., Limited. This has a manually operated jacknife door and, as is frequently the case with modern one-man buses, the driver's seat can swivel to assist him in the collection of fares. Intended particularly for rural routes, the vehicle has both parcel racks and a large-capacity rear locker.

Use of Standard Shell

The third Willowbrook exhibit is a 43-seat dual-purpose body intended primarily for express service operation. Destined for the North Western Road Car Co., Limited, this A.E.C. Reliance has the same basic shell as the standard bus which this bodybuilder is producing in quantity for the B.E.T. companies. It has air-operated glider type doors, full length racks and a large rear locker. Demisters are fitted as, of course, is coach heating.

Another exhibitor from Loughborough is W. S. **Yeates,** Limited **(Stand No. 42).** This firm has always paid particular attention to the luxury coach market and on the stand is a 41-seat Europa body on a Bedford chassis. It may be added that there are also two Europa-bodied Bedfords in the demonstration park.

MATERIAL MATTERS

After considerable research, the Boase Spinning Co., Limited, Dundee, has developed a new type of protection against sulphuric acid attack on cloth. The new development is said to increase the life of canvas on oil-burning ships by three times when exposed to acid burns.

Warerite plastics are now available in plain colours in both gloss and matt finishes. The manufacturer, Bakelite, Limited, announces that a range of plain colours which has already been selling on the export market is to be added to the standard range available in this country.

Modern equipment for the welding laboratories to be opened soon at the Matthew Boulton Technical College, Suffolk Street, Birmingham, which will train welders and welding engineers to meet the increasing demand by industry for workmen in these fields, has been supplied by Quasi-Arc, Limited, Bilston, Staffs.

To avoid confusion with the trade name of a roofing material, the heavy-duty densified wood flooring material manufactured by Permali, Limited, is now being registered as "Permatred" in place of "Permadec." This change of name does not mean any alteration in the technical qualities of the material, demand for which is growing, especially in transport industries.

Silicon power cells, referred to in connection with rectifiers for 25,000-volt 50-cycle electric traction in our September 13 issue, are being produced in a new plant at the B.T.H. Rugby works where germanium power cells are now in mass production. Increasing use is also being made of Rugby-made semi-conductor rectifiers for industrial applications.

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"Sure I can. No waiting for traffic with this, I can get straight into the body too, without going round the back at every call."

"Looks a very useful tool!"

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STAND 94
COMMERCIAL MOTOR SHOW

September 26th—October 4th

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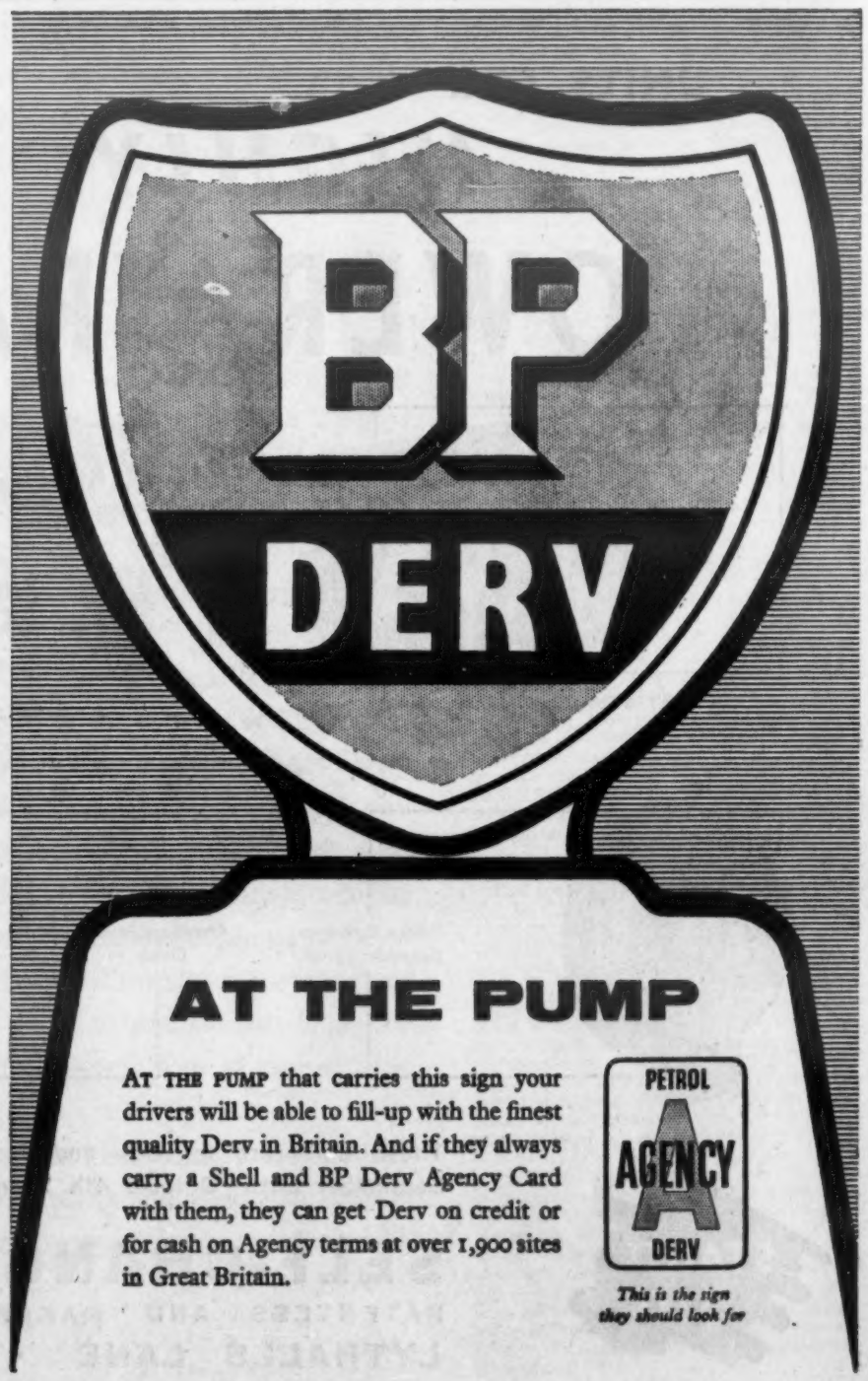
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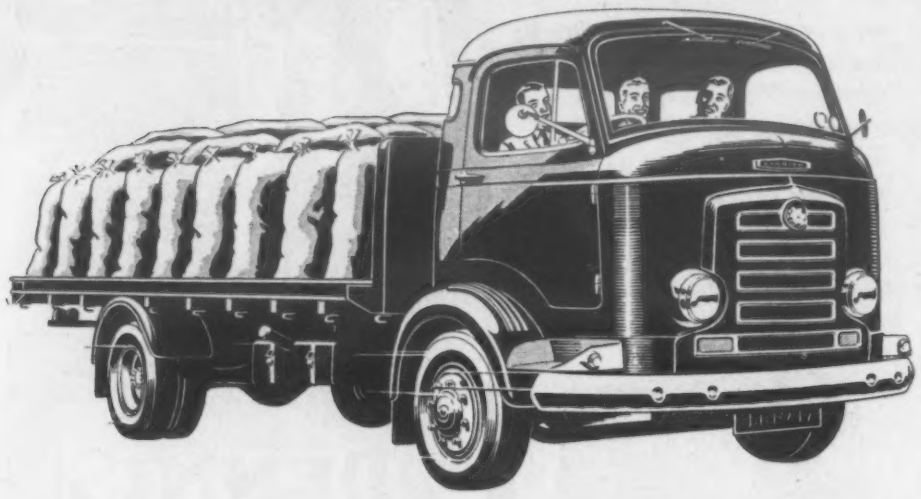

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NEWS FROM ALL QUARTERS

Great Northern Stations Closing

On and from October 6, passenger train service will be withdrawn from Rossington, Bawtry, Ranskill and Crow Park stations—all four stations being situated on the Great Northern main line between Newark and Doncaster.

Opposition to M. and G.N. Closure

Delegates from Norfolk authorities and Kesteven and Holland County Councils have decided that counsel should be briefed to appear before the East Anglian Transport Users Consultative Committee to oppose the threatened closure of the Midland and Great Northern section of the Eastern Region. The National Farmers Union was associated in this move.

Spur from London–Birmingham Motorway

An immediate start is to be made on an additional 1¼-mile spur from the London—Yorkshire motorway. It will run from Watford Gap, south-east of Rugby, where the Birmingham spur of the motorway swings sharply to the west, and will extend northwards to join the Rugby—Northampton road, A428, at a roundabout just west of Crick. The new section will in fact be the first short length of the proposed Yorkshire spur. It will increase the value of the motorway now being built by enabling it to be used more conveniently by traffic between London and the north Midlands and places further north.

Offer for Swansea and Mumbles Railways

The expected offer for the whole of the issued shares and debentures of the Swansea and Mumbles Railways, and Mumbles Railway and Pier Company has materialised from the South Wales Transport Co., Limited. The offer consists of 18s. for each £1 of the Railways 4 per cent debenture stock; £8 17s. 6d. for each £10 4½ per cent preference share; and £7 17s. 6d. for each £8 ordinary share. Mumbles Railway and Pier is offered £7 17s. 6d. for each £10 4 per cent preference share; £9 19s. 6d. for each £10 ordinary share (fully paid); £3 16s. for each £10 ordinary share (£4 paid); £2 17s. for each £10 ordinary share (£3 paid); and £1 18s. for each £10 ordinary share (£2 paid). Acceptance is recommended by the directors.

Modernisation on Italian Railways

In announcing that the Italian State Railways will probably show a reduced deficit for the financial year started July 1, 1958—an estimated loss of L.40,900 million is given as against L.54,500 million for 1957-58—the railways board has stated that over the year and during the next few years a programme for the modernisation and extension of the Italian network will be carried out. Cost of the modernisation scheme is set at L.2,500,000 million (about £1,500 million) over a period of five years. The programme allows for electrification plans, as well as dieselisation, relaying of track and building of new bridges, etc., particularly in an attempt to reduce the number of level crossings now in use. Under the first stage of the scheme, 216 electric locomotives and 39 diesel railcars will be purchased. Orders will be placed for 5,100 goods wagons and 350 passenger coaches.

Car Hire for Rail Users

Swiss Federal Railways has concluded agreements with garages in Bale, Berne, Bienne, Geneva, Lucerne, St. Gallen and Zurich, with the object of placing self-drive cars at the disposal of passengers.

Diesel Railbus on Speyside

Local dignitaries were last week given an opportunity to inspect the Bristol-E.C.W. diesel railbus for service on the Scottish Region 51-mile Speyside route between Elgin, Grantown-on-Spey and Aviemore, and it was also on display to members of the public. This vehicle is one of two from the same manufacturers. It is a four-wheeler 42 ft. 7 in. long and weighing 13¼ tons. It has seating accommodation for 56 passengers and the Gardner 6HLW engine gives it a speed of 50-55 m.p.h.

Television for Station Working

As part of a rationalisation scheme, the Hamburger Höchbahn is to install experimentally a television apparatus at its central city underground station of Mönckebergstrasse. A camera will be set up over one of the station's two platforms and a picture continuously trained on the opposite one. This will enable the stationman responsible for signalling trains off and himself operating a signal just inside the tunnel to handle both platforms and not just one as at present. A stationman is required at many stations for this job.

Meriden By-Pass Partly Open

Four months ahead of schedule, one of the two carriageways on the newly constructed Meriden by-pass near Birmingham was opened to traffic on September 15. The second carriageway is expected to be in use on September 30. An official opening ceremony by the Minister of Transport had been planned for October 13, but it will now take a slightly different form, not interrupting the flow of traffic. This five-mile improvement scheme is part of a comprehensive plan to provide twin two-lane carriageways on route A45 between Dunchurch and Birmingham to carry traffic from the London—Birmingham motorway.

Malayan Diesel Railcars

Last month the first of six stainless steel diesel railcars which the Malayan Railway ordered from the Commonwealth Engineering Co., Limited, New South Wales, was named in a colourful ceremony at Kuala Lumpur station by the Minister of Transport, Inche Abdul Rahman bin Haji Talib. He was called upon by Mr. D. D. Bartlett, general manager, Malayan Railway, to unveil the name plaque, *Hang Tuah*, on the railcar. (Hang Tuah was a 15th-century Malayan hero of many virtues.) These railcars are so constructed that they can be joined together in multiple units (up to a total of 12) or can operate singly. The railway intends to experiment with one diesel railcar hauling one locally built trailer coach. The railcar weight in working order is 33 tons and length over buffer beams is 61 ft. 6 in. There are seats for 12 second-class and 40 third-class passengers. The Rolls-Royce Hortz six-cylinder supercharged diesel engine of 214 b.h.p. at 1,860 r.p.m. gives the car a top service speed of 65 m.p.h.

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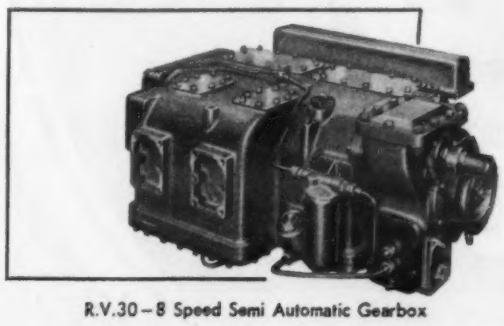
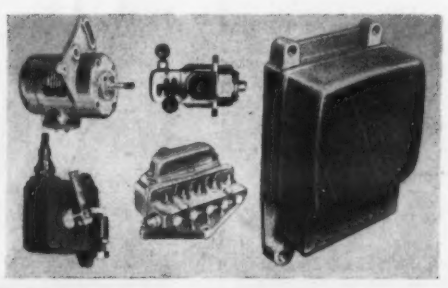
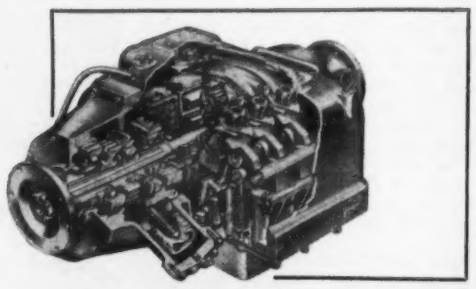


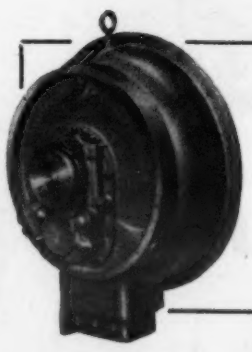
R.V.30–8 Speed Semi Automatic Gearbox



V.S. Automatic Control

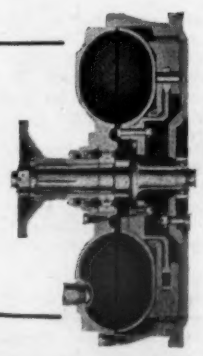


R.V.28–4 Speed Automatic Gearbox

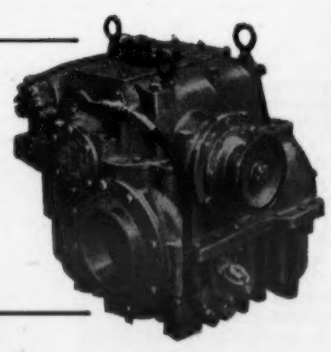


Torque Convertor (Schneider System)

Centrifugal Fluid Clutch



R.F.28–Reverse and Final Drive Unit



These units are on view and demonstrated at The Commercial Motor Show, September 26th—October 4th. Stand No. 310. Section C. First Floor, Earls Court

STAND 310

SELF-CHANGING GEARS LTD

PATENTEES AND MAKERS OF THE WILSON GEARBOX

LYTHALLS LANE • COVENTRY • ENGLAND

COMMERCIAL AVIATION

Export Procedure Eased

OUTLOOK FOR U.A.L.

RELAXATION of customs restrictions on cargo exported from the United Kingdom will enable the British Overseas Airways Corporation to speed up this service to shippers. From October 1 the Commissioners of Customs and Excise with approval of the Treasury and Board of Trade have agreed to relax requirements in regard to pre-entry of exports to countries outside the sterling area. This means that from October 1 for consignments up to a value of £500 f.o.b., not in a category for which an export licence is required, or which are being exported on drawback, ex-bond or otherwise under revenue control, it will not be necessary to present documents before despatch. The documents may instead be presented afterwards. The relaxation does not affect exportations by post or consignments which form part of a larger shipment exceeding £500 value f.o.b. It does not relieve exporters of their standing obligations under the Exchange Control Act, 1947, in regard to exports to prescribed countries and surrender of foreign exchange.

Silver City Charges Reduced

For an off-season period of eight months, starting on Wednesday, October 1, the cost of flying a car across the Channel to France is to be cut by Silver City Airways following experimental cuts during the same period last year which raised spring and winter traffic by 99 per cent. Routes to be operated by Silver City throughout this winter are Lydd (Ferryfield) to Ostend, Calais and Le Touquet, with the cheapest rates and greatest frequency applying to Le Touquet.

Swissair—Orient Agreement

Swissair has concluded an air-sea agreement with Orient Line (Orient Steam Navigation Company, Limited) for traffic to the Far East. It covers the interchange of return tickets between the two companies and provides for the usual round trip discounts. Air-sea agreements are also in operation on the Far East routes between Swissair and Anchor Line, Blue Funnel Line, P. and O., British India, Glen Line, Compagnie des Messageries Maritimes and Lloyd Triestino.

Sabena Winter Timetables

Ankara and Tehran will be served by Sabena when its winter timetables are introduced on November 1. Both for the Turkish and the Iranian capitals the service operated will be one flight weekly. On the Belgium—Belgian Congo service the frequency between Brussels and the Eastern Congo will be maintained at practically the same level as during the summer. Another innovation is that the aircraft flying to Palma de Majorca will call at Barcelona, while Vienna is to become a call on the Brussels—Athens—Cairo route.

Financing New A.A. Aircraft

On the subject of jet transport aircraft, of which American Airlines has a total of 110 on order, Mr. W. J. Hogan, executive vice-president, finance, recently disclosed more of the financing details and unique engine leasing arrangements behind the purchase of the aircraft. The total value of the jets comes to roundly $445 million, made up of $365 million in direct capital outlays, and $80 million, which would have been required had American not been able to enter into lease arrangements. By type of aircraft, the $365 million breaks down this way:

	$
25 Boeing 707-123 (long-range)	135,500,000
25 Boeing 707-023 (medium-range) ..	82,000,000
23 Convair 600s	82,400,000
35 Lockheed Electras	65,100,000

Engines of all the aircraft except the 25 long-range Boeings were leased from the manufacturer, which resulted in a reduction in capital outlay of $80 million. Cash deposits had already been made to manufacturers to the tune of $57 million.

Advertising Slogan

An unusual advertising service for the international airlines has just entered its tenth year of publication by the International Air Transport Association. The *I.A.T.A. Register of Airline Slogans*, issued by the Association's Public Relations Office, provides a means by which the scheduled airlines can establish recognised precedent dates for the use of their individual advertising and promotional phrases and slogans and so avoid duplication and conflict. The new edition of the Register, which has been distributed to I.A.T.A. members and their advertising agencies, contains some 1,200 listings in more than a dozen languages. They cover a wide range of topics, from air cargo and airline travel plans to names for specific services and routes. In its present form, the Register lists advertising terms submitted by members with the date of initial use or submission as evidenced by advertising proofs, tearsheets or other corroborative material. Where a possibility of duplication or conflict arises, I.A.T.A. will warn the member concerned and can refuse to register the item, but this refusal does not prevent the airline from using the slogan if it insists.

Doubts of United President

Improved earnings for United Air Lines in the six months ended June 30 have been reported by Mr. W. A. Patterson, the president, in a statement to stockholders. Net earnings were $4,001,143 and sale of surplus aircraft added $138,371 to bring the total to $4,139,514. Six-month operating revenues totalled $148,073,637, an 11 per cent increase over last year. Passenger revenue was up by 11 per cent, freight by 11¼ per cent, mail 8 per cent and express 4 per cent. Operating expenses amounted to $139,356,258, an increase of 8 per cent. Second quarter operating revenues of $81,929,725 were 12½ per cent above last year's record total for this period and net earnings and gain on aircraft sales amounted to $4,524,107 as against $2,605,952 in 1957. Operating expenses were $72,633,882, up 8 per cent. Traffic increases in the first half of 1958 had been more modest than revenue gains indicated, Mr. Patterson said. The expansion in revenues reflected the fare ipcrease which the Civil Aeronautics Board granted in February and a 6 per cent rise in revenue ton miles. The increase in ton miles was largely explained by the fact that a competing airline was strikebound for many weeks. Allowing for non-recurring factors, the present level of earnings continues to provide inadequate returns on the capital invested. It appeared unlikely that the C.A.B. would complete the general passenger fare investigation this year. Thus another interim fare increase was essential.

MESSAGE FROM BRITAVEMA

From Sir HENRY SPURRIER, Chairman of the British Transport Vehicle Manufacturers' Association

• • • • • •

● The heavy commercial vehicle manufacturers and their agents have experienced, over the last 18 months, a distinct period of recession in both home and overseas markets, and more particularly so at home.

● If I were asked to give specific reasons for this rather sudden decline in trade, I would say, first of all, that our domestic market started its downward path from the time of the Suez crisis, and conditions deteriorated still further on account of the credit squeeze. There has been no alleviation in purchase tax, which amounts, on some larger vehicles, to £1,000 and even more, and in addition there is hanging over the industry the possible threat of re-nationalisation after the next general election. All these factors have contributed to the decline in business. Export markets are subject to ever increasing competition, particularly in price and credit terms, by our foreign competitors.

● As to the future, I suggest that prospects at home will depend, very largely, on Government policy. A steady reduction in the Bank Rate is already showing an improvement in conditions. Purchase tax, which achieves little, other than to put up the cost of road transport, should be removed altogether, after which I would expect to see a slow return to near normal once again in the home market.

● No such artificial adjustments, however, can be applied to overseas markets. There we can sell in the quantities we desire only by offering a range of products which compare more than favourably in specification and price with our foreign competitors. Credit facilities in many cases are insisted upon and must be met if we are to have a chance to get the business. Again we look to the British Government to give us their continued practical support.

● The Commercial Vehicle Exhibition at Earls Court, I am confident, reveals that in engineering technique, quality and variety in models, to suit all forms of road transport, British manufacturers lead the world.

H. Spurrier

SIGNAL ENGINEERS

Annual Dinner

VALUE TO MODERNISATION

THE annual dinner of the Institution of Railway Signal Engineers was held in London on September 19, with the president, Mr. J. F. H. Tyler, in the chair. In proposing the toast of the Institution, Mr. John Ratter, technical adviser, B.T.C., and president, Permanent Way Institution, said tremendous complications had come into the life of the engineer since the P.W.I. and I.R.S.E. were formed. In those days it was possible for a general manager to know all about the technical equipment of a railway. Heat was not bottled up in long-welded rails and structures looked what they were—not concrete concealing piano wires.

Electronics Bring Changes

Perhaps no change was as great as those in signal engineering—the signal engineer was a transformed person with the coming of electronic techniques. The responsibility of the engineer was much greater than it used to be; he was responsible for seeing that management had the best offering from the engineering profession as quickly as possible. The signal engineer could only be taught on the railway or in the works of the few manufacturers; it was a science taught in no university. The qualification for full membership of the Institution was at a very high standard and he therefore felt bound to ask whether enough was being done to recruit all the skilled signal engineers we needed. The job was a fascinating one and it should attract the very best type of eligible young men.

The railway modernisation plan was now estimated to cost about £1,500 million, about one-tenth of which represented signalling work. About half that sum again was being spent on lines being electrified—about one-fourth of the cost of electrification went, in fact, on signalling. Signalling equipment exceeded the cost of overhead electric traction gear and there was a great need to bring the cost down or else the progress of electric traction would be inhibited. It was imperative that the work should be done at a price the railways could afford and ensure efficiency and safety. It was therefore of the utmost importance to further the design of lighter and less costly equipment. The B.T.C. would support the Institution in that effort to the limit.

Position of the Profession

Responding, Mr. J. F. H. Tyler thanked Mr. Ratter for his references to the Institution and its work. On October 1, Mr. Ratter would leave his present post of technical adviser to become a full-time member of the British Transport Commission, and Mr. Tyler offered him, on behalf of everyone present, heartiest congratulations and good wishes for the future. Mr. Ratter would succeed Sir Landale Train, whom the signalling profession in this country, under nationalisation, had to thank for its independent position in all regions of the British Railways' organisation. Mr. Tyler expressed to Sir Landale and to Lady Train very best wishes for a long and happy retirement.

The Institution was founded in 1912 to promote the science of railway signalling. It was unlikely that the founders then thought they would have 1,300 members or that the B.R. signal staff would total 15,000. Years ago, the introduction of modern signalling was justified by the direct economies it produced. Nowadays, there was a more enlightened outlook, and it was realised that increased efficiency in operation produced its own economies.

Modernisation

The signal engineer and the manufacturer had at their disposal every modern scientific aid and it might be fairly claimed that there was very little which could not be done towards eliminating the human element in railway operation. The Institution had taken a lead in seeing what could be done towards keeping costs down, without relaxing safety in any way, by setting up the so-called miniaturisation committees, where manufacturers and users together were re-designing certain equipment. Mr. Tyler thanked the manufacturers for their co-operation in this work, the progress of which was encouraging, although too slow to satisfy everyone. The Institution would play its part to the limit of its resources. If costs could be reduced the user would spend more money, not less, and the manufacturers would have the benefit in extra overseas business. Some 150 members visited Copenhagen this year and enjoyed the overwhelming hospitality of the Danish State Railways and the firm of Ericssons. He hoped that in some future year they would be able to accept the Swedish invitation to see c.t.c. equipment north of the Arctic Circle. He pointed out that the full corporate membership involved not only passing the Institution's own examination, but the associate membership examination of the Civils, Mechanicals or Electricals.

The railways of this country were by no means a back number, and the signal engineering profession was taking its share of the responsibility for seeing that the modernisation plan was justified. The regional signal engineers were working under very high pressure to achieve results, as were the manufacturers, and good wishes were offered to them in their endeavours to meet their targets. He thanked Mr. V. H. Smith for his assistance in arranging the dinner.

Sterling Worth

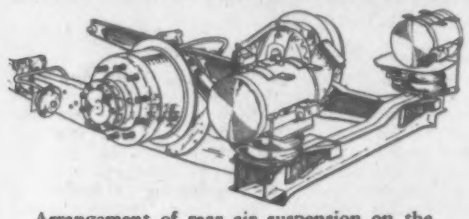
The toast of "The Visitors" was proposed by Mr. D. G. Shipp, who extended a cordial welcome to them all. The reply was by Brigadier C. A. Langley, Chief Inspecting Officer of Railways, who said that he had been asked by the Minister of Transport, Mr. Harold Watkinson, to say how much Mrs. Watkinson and he regretted that they could not be present that evening. During the last 12 years, said Brigadier Langley, he had come to appreciate the sterling worth of the signal engineer in improving railway operation and safety of railway travel. He had inspected signal-boxes of all types and sizes throughout the land and had been constantly impressed by the meticulous care which was taken, not only in the installation of the equipment, but more important still, in the scrupulous testing, down to the last detail.

At the invitation of the president to say a few words, Sir Landale Train stated that his great desire, since the time of wires, rods and cranks had been left behind, was to see signal engineering as a separate profession, and he was delighted to have proof of how well they were doing it. He expressed his pleasure at being followed by Mr. John Ratter, who had shared his views throughout.

PRODUCTION BRIDGEMASTER

New A.E.C. Engine and Air Suspension

APPEARING on the A.E.C. stand and in the demonstration park at Earls Court are production versions of the A.C.V. Bridgemaster, the Park Royal-A.E.C. 76-seat low-height integral double-deck bus employing independent suspension and quickly removable running units. The two prototype Bridgemaster buses which appeared at the last Commercial Motor Show represented something of a compromise. Designs for a 27-ft. long Bridgemaster powered by the AV470 engine were well in hand when the regulations were amended to permit the operation of double-deck passenger



Arrangement of rear air suspension on the production A.C.V. Bridgemaster

vehicles of 30 ft. overall length. It was obvious that the new vehicle must cater for the requirement for a vehicle with the new maximum overall length but while it was a simple matter to alter the design of the body structure to increase the length, it was not possible at that late stage to redesign the mechanical parts to take the larger power unit that was considered essential for a production vehicle carrying upwards of 70 passengers.

The first two prototypes were therefore completed in order to gain operational experience of the unorthodox features incorporated in this advanced design, but with the knowledge that the vehicle would have to go into production with a larger power unit. Three further prototypes were then put in hand incorporating the 9.6-litre A.E.C. engine and the heavier four-speed synchromesh gearbox that goes with it. As in the original design, it was still necessary to employ a train of transfer gears behind the main gears to carry the drive over to the left-hand side of the vehicle. It was decided however that the production Bridgemaster would have the new A.E.C. AV590 engine as it was found that the more compact dimensions of this unit enabled it to be inclined more in the frame so that the necessary clearance for the propeller shaft could be obtained without the need for a transfer gear train in the mean gearbox. This step has improved the transmission efficiency and hence the fuel consumption, though in fact, the prototypes already operating were proving most satisfactory in this respect.

Air Suspension

Meanwhile, it was felt that while the unorthodox coil-pring suspension at the rear had shown a very satisfactory improvement in the ride compared with the normal leaf-spring double-decker, some further improvement could be obtained by the incorporation of air suspension, which had by then reached a stage in development at which its incorporation in a production vehicle could be accepted. Experiment proved that this was correct and it was announced some months ago that the production machines would be so equipped.

The production examples of the Bridgemaster at this year's exhibition differ radically from the vehicles exhibited two years ago only in the new power unit and four-speed synchromesh gearbox without transfer gears and in the air rear suspenssion. Many thousands of miles run during demonstrations and in operation throughout the country by the prototypes have proved the soundness of the basic design.

Most noticeable among detail changes in the production vehicles is a modification of the steering layout, which now comprises a more-or-less conventionally mounted worm-and-nut steering unit coupled by a fore-and-aft drag link to a bellcrank lever pivoted well behind the line of the independently suspended front wheels. Attached to the bellcrank is an arm which extends forward, together with a similarly mounted slave arm on the nearside, to take the sections of the three-piece track rod mounted behind the wheel centres.

The new AV590 engine is one of a new A.E.C. range of rationalised units following the general basic design of the now well-established and extremely successful AV410-470 engines developed to power the Mercury goods and Reliance and Regent V passenger ranges. The AV 590 and 690 have the same bore and stroke as the earlier 9.6- and 11.3-litre engines, which they now replace. The AV590 which powers the production Bridgemaster has an output of 125 b.h.p. at the normal governed speed of 1,800 r.p.m.

Body Structure

The principal feature of the Bridgemaster is the use of orthodox layout of both saloons in an overall height of only 13 ft. 5¾ in. laden and unladen, which makes it particularly suitable for operation

P.R.V. Group 30 ft. by 8 ft. Bridgemaster with 76 seats in 13 ft. 5¾ in. unladen height; right, close-up of the rear platform which has constant height irrespective of load due to the air suspension

where low bridges preclude the use of normal-height double-deckers, though its advantages in passenger comfort, ride and ease of maintenance make it an attractive proposition also for use in place of orthodox vehicles.

The basis of the Bridgemaster integral structure is a main underframe of aluminium-alloy channel-section members, solid riveted and extending from front to rear bulkhead. To deep transverse members, shaped to form the sunk gangway are riveted alloy floor plates, the whole forming a rigid beam of box form. This unit provides the anchorage for the front and rear running-unit sub-frames and all ancillary equipment and to it are rigidly attached the main load-carrying front and rear bulkheads and the stressed side members which, from skirt to upper saloon waist, are also load carrying. The main bodyside pillars are of steel channel section, riveted to which are the interior stress panels in each saloon which incorporate the waist rail and carry the seat rails and lower saloon floor rail. The intermediate roofsticks are alloy pressings which, with alloy longitudinals and intermediate sticks, carry the one-piece plywood upper saloon floor. Exterior panels are blind riveted to cappings in the pillars, while the upper saloon is completed by a roof unit formed of tubular sticks from waist to waist, carrying the windows, roof panels and domes.

Two versions are exhibited in Earls Court. On the A.E.C. stand is a 76-passenger 30 ft. by 8 ft. bus for Sheffield Corporation, having 31 seats in the lower saloon and 45 in the upper. Very lightweight seats are trimmed in moquette and hide in the lower saloon and hide in the upper, and the saloon interiors are paint finished to match. In the demonstration park is a 27 ft. by 8 ft. version for 68 passengers, which is one of 20 ordered by Western Welsh Omnibus Company. The seating is arranged with 27 in the lower and 41 in the upper saloon, on tubular seat frames with latex foam cushions and padded squabs, the trim in the lower saloon being moquette and hide, and in the upper in plastic cloth throughout.

DUNLOP
DISC BRAKES
—sure power for safe stopping on
the commercial vehicles of tomorrow
All details available on the Dunlop Stand (No. 369) at the
Commercial Motor Show, September 26th—October 4th

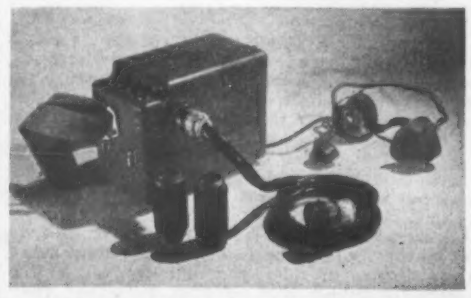
CABLE TESTING

Versatile de Havilland Unit

ENTERING the general engineering field for the first time save for certain excursions to meet special requirements, the de Havilland Enterprise has produced a most useful piece of equipment. It is produced by de Havilland Propellers, Limited, and made its first public appearance at the recent Farnborough show. This cable test set provides, in easily portable form, the facilities for checking the continuity and insulation of multi-core cable looms hitherto available only in fixed or cumbersome equipment. Although initially designed for checking electrical systems in aircraft, the unit is of particular value in any type of installation where cabling is already in place, or where the cable runs are in confined spaces; its applications thus extend to many types of industry, including shipping, railways, mining, communications systems and factory maintenance.

Method of Operation

Either a continuity or an insulation check can be carried out from one end of a cable run, the far end being terminated by a small unit weighing less



The new de Havilland cable test set with its connector, termination unit and headset

than ½ lb. (450 gm.). A test is initiated by a press button and the instrument automatically selects each wire in turn. The identification of the core undergoing test is indicated in a window which is illuminated by a red light if failure occurs, in which case the selector stops at the faulty core. Successful completion of a test sequence is indicated by the extinguishing of a separate indicator lamp. A reset button prepares the test set for a further test sequence.

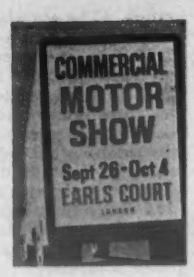
A single outlet from the test set can be adapted for use with any cable by means of a suitable coupler supplied against the customer's requirements. In the case of a connector having a multi-position keyway the coding is checked by a clearly marked movable keyway on both the coupler and termination units. To enable long cable runs to be tested in conditions where the termination unit is more conveniently attached by a second operator, an intercommunication amplifier is incorporated in the instrument, connection being made via the cable under test; standard service style headsets may be used. When this system is in use the operators receive an additional audible signal as each test is made and can distinguish when a cable failure is detected.

Portability

In its portable form the cable tester is mounted on a strap which can conveniently be used either as a neck sling or a carrying handle. Power is supplied by a lightweight battery of a type having no free electrolyte, and of sufficient capacity for about 16 hr. of normal use. Couplers and termination units can be carried in pouch-belts. For difficult situations, where access to the cable to be tested is limited, an extension cable can be used. A charging unit can be supplied which can be incorporated in the transit case used to carry the test set and its accessories. Placing the test set in the case makes the charging connections, and internal regulation ensures that in four hours the battery will be fully charged, yet there is no risk of overcharging however long the equipment is left. The state of charge is indicated by a meter. An a.c. power unit is available as a replacement for the battery when the test set is in use on the bench or near a mains supply.

SUPER CONSTRUCTOR

Easier Control and Riding for Big Scammell



AN addition to the successful all-wheel-drive Constructor range produced by Scammell Lorries, Limited, is on show at Earls Court this year. Named Super Constructor, the new vehicle, in common with the rest of the range, is for use as a tractor, lorry or oilfield drilling-rig or crane carrier on or off the road. In use as an articulated tractor, in which form it is exhibited, the Super Constructor will deal with gross loads of 75 tons off the road while as a lorry it will carry a load of 30 tons. As an independent tractor on the road, it will cope with a gross train weight of 150 tons.

Ease of control has been the main consideration in the design of the new chassis. Gear changing is controlled merely by the movement of a lever on the steering column and can be carried out at full engine torque. There is no pedal to operate, the effort being supplied by direct air pressure, which also obviates the use of electrical relays. Power is provided by the Leyland EN901 230-b.h.p. six-cylinder diesel engine and hydraulically assisted power steering gives maximum assistance to the driver especially when travelling over rough country. Moving the engine completely forward of the dashboard has given more room in the cab with less noise and heat and better access for maintenance.

The driver will also benefit from the improved front suspension. The well-tried Scammell rocking front axle, which eliminates frame distortion and gives even wheel loading, is retained in principle but has been redesigned to utilise coil springs and built-in shock absorbers to give a much-improved ride with low periodicity. Axle location sideways is by Panhard rod, and fore-and-aft location by torque arms ball-mounted to the chassis.

S.C.G. Eight-Speed Gearbox

The Leyland direct-injection diesel engine has bore and stroke dimensions of 5½ in. by 6½ in., giving a capacity of 926 cu. in. (15.117 litres), and develops 230 b.h.p. at 1,900 r.p.m. and 704 lb./ft. torque at 1,400 r.p.m. It drives through a Fluidrive Type 550 fluid coupling matched to the engine characteristics, which has practically no slip and no loss of torque at maximum speed and allows overrun braking down to quite low engine speed. A short universally jointed propeller shaft links the coupling to a separately mounted Self-Changing Gears eight-speed epicyclic gearbox.

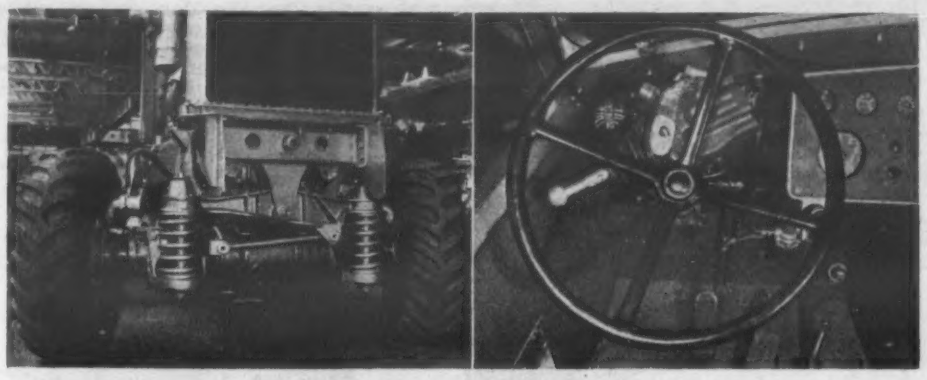
The gear control is of the notch type which provides progressive changes in each direction and prevents the jumping of a ratio. A governor-controlled stop prevents any change down that would seriously overspeed the engine. It is only necessary to move the control lever forwards or backwards to change into the next lower or higher ratio, the gear selected being shown automatically on an internally illuminated dial. To engage neutral from first gear however requires the depression of a knob on the end of the lever to release a safety stop fitted to prevent accidental entry into neutral. The gearchange mechanism forms a self-contained unit requiring no maintenance or lubrication. A single-speed transfer case bolted to the rear of the gearbox provides output flanges for the three propeller shafts, one to each of the double-reduction axles, and a power take-off capable of transmitting full power in any of the gearbox ratios.

Axles and Suspension

Many of the components used in the three axles, which employ spiral bevel central gear and epicyclic hub gears, are interchangeable. The front axle has constant-velocity universal joints in its fully floating half shafts and the front-axle drive can be engaged and disengaged while the vehicle is in motion by means of a dog clutch. The new front suspension has already been mentioned and is illustrated on this page. The established Scammell bogie suspension as used on the Constructor, with two ball-and-slipper-mounted semi-elliptic springs and its unique method of location which permits only negligible load transference when driving and braking, and separate propeller shafts to each axle have been retained in the new chassis. The system, which has been well proved under the most arduous conditions, provides a 12-in. vertical movement of the bogie and 17-in. cross articulation at the track centre.

Four-piece wheels, twins on the bogie axles, are fited with 14.00-20 desert tyres and the Marles cam-and-double-roller steering gear with continuous-flow hydraulic servo is arranged for left-hand control. Brakes of Girling design with floating wedge expanders are air-pressure operated; trailer couplings are fitted at the rear and are available for double-headed and shunting trailer operation. A Neate multiple-pull handbrake is independently connected to the four brakes on the bogie.

The chassis is fully equipped, with 24-volt electrical system incorporating tropicalised units. The articulated tractor has a wheelbase of 205 in., front and rear track dimensions of 88 in. and 79⅛ respectively, overall length of 303¼ in. and overall width of 112⅞ in. With standard axle ratio of 10.25 to 1, it provides a maximum tractive effort in first gear of 39,100 lb. and the eight-speed gearbox provides an operating range fully loaded from a gradient ability of about 1 in 4½ in. in first gear to a speed in top gear of 32 m.p.h.



New front suspension of the Super Constructor retains the Scammell rocking-beam but now incorporates coil springs and built-in dampers; right, a view into the driving position shows the absence of clutch pedal and the simple gearchange lever under the steering wheel for the eight-speed S.C.G. gearbox

Multiple Delivery Van Design

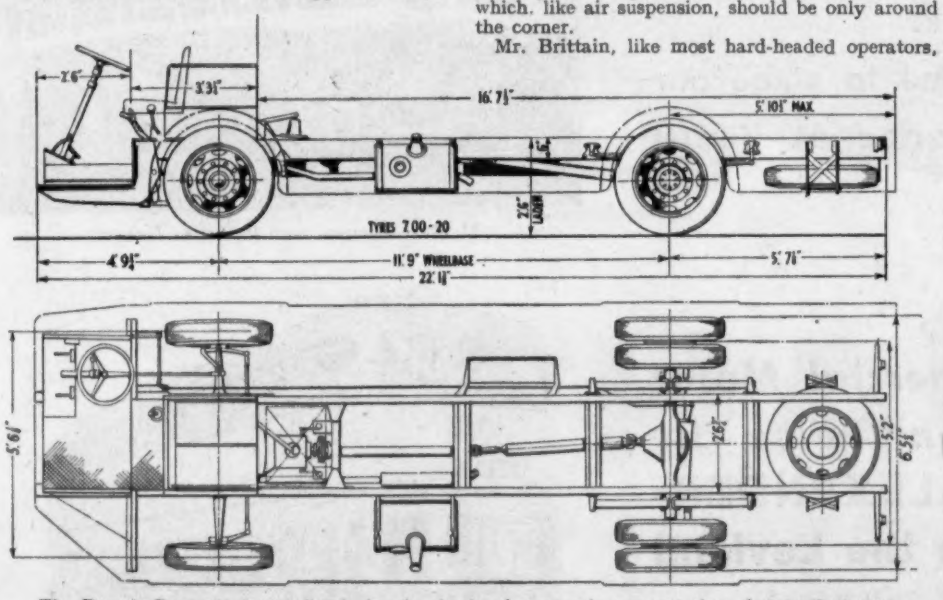
WHAT A USER WANTS

PARCEL vehicle design has recently occupied space in our columns; earlier this year a British Road Services vehicle adapted for its use from a forward control chassis was described and a few weeks ago the Dennis Paravan 3-ton forward-control van made its appearance (see September 6 issue). The latter vehicle owes much to the inspiration, backed by experience, of Mr. R. B. Brittain, managing director of Essex Carriers, Limited, of South Benfleet.

In the knowledge that Mr. Brittain was assisting Dennis Brothers, Limited, to evolve a special purpose vehicle with many potential uses in the door-to-door and multiple-delivery field, he was approached to deliver himself of some ideas on what would be the ideal vehicle for these purposes. Needless to say, many of his suggestions have been embodied in the Paravan; he has other ideas which are as yet not capable of immediate fulfilment but which, like air suspension, should be only around the corner.

Mr. Brittain, like most hard-headed operators, wants a diesel engine for his vehicle, but does not want what he regards as surplus horsepower. A four-cylinder engine combines fuel economy with all that is necessary in the way of performance in a vehicle which spends most of its time in urban surroundings. Surroundings, in fact, exert a big

(*Continued on page* 30)



The Dennis Paravan 3-ton diesel chassis—basis of a parcels van meeting the requirements outlined in this page. The completed prototype van for Essex Carriers, Limited, was illustrated in our September 6 issue

Stand 45

Low bridge type Leyland-M.C.W. Atlantean for Maidstone & District Services Ltd.

Olympian semi-coach with Leyland running units for Western Welsh Omnibus Co. Ltd.

Stand 76

Normal height double deck omnibus body on Daimler chassis for West Bromwich Transport Dept.

Stand 75

Low bridge type Leyland-M.C.W. Atlantean for J. James & Sons, Ltd.

Earls Court

Demonstration Park

Double deck omnibus body on A.E.C. Regent chassis for Rochdale Corporation Transport Dept.

Rear entrance, front exit double deck trolleybus body on Sunbeam chassis for Bournemouth Corporation Transport

Stand 63

Stand 46

Normal height Leyland-M.C.W. Atlantean for Wallasey Corporation Motor Buses

Series 2 Olympic with Leyland running units for South America

METROPOLITAN-CAMMELL-WEYMANN LIMITED
VICKERS HOUSE, WESTMINSTER, LONDON, S.W.1

AP185

The choice of the Passenger Transport Industry

Connolly Leather

COMMERCIAL MOTOR SHOW STAND 244

CONNOLLY BROS (CURRIERS) LIMITED
CHALTON STREET · EUSTON ROAD · LONDON N.W.1
TELEPHONE: EUSTON 1661-5

Components and Accessories

(*Continued from page 13*)

matic gearchange control comprises drive selector switch (including positional notches for manual override of automatic operation), electropneumatic valves, speed sensing alternator, torque-sensing accelerator switch and relay box as used in A.E.C. Automonocontrol and other automatic systems. The company also demonstrates the four-lamp headlamp system now appearing on some commercial vehicles in the show, which provides more efficient driving and meeting beams than the present two-lamp system.

The wide range of **Exide** commercial vehicle batteries is displayed on **Stand No. 364** by Chloride Batteries, Limited. A feature of the company's policy well illustrated on the stand is the development of units designed for specific purposes, thus providing maximum efficiency, and a selection of sectioned batteries to show the construction is included.

Integral Brake Reservoir-Servo

New on **Stand No. 440** is a **Clayton Dewandre** Hydrovac with combined reservoir, as well as various examples of the established versions of this lightweight vacuum-hydraulic servo, and the same principle of combined servo and reservoir for air pressure-hydraulic operation in the Airpak unit. There is also a new line-mounted non-return valve for trailer brakes; the recently introduced relay valve to reduce delay time in the operation of remote vacuum-operated brakes, for example, the front servos of triple-servo systems and trailer servos; new control units for two-speed axles; a new single-cylinder compressor for use with the Airpak servo; a gear-changing servo; and items from the established range of vacuum, air pressure and exhaust brake equipment. A new automatic chassis lubrication system shown provides this facility for tractor-trailer combinations, there are new heating and demisting units and various levelling valves for air-suspension systems are shown for the first time.

Cords Piston Ring Company makes a feature on **Stand No. 345** of the 21st anniversary of its origination of the laminated dished alloy-steel piston ring and shows a range of boxed engineered sets of rings extended to include many more engines.

On **Stand No. 406,** the F.S.C. (factory sealed charge) feature introduced by **Crompton Parkinson,** Limited, for its car batteries some time ago is shown applied to its wide range of commercial vehicle batteries for the first time. F.S.C. permits new batteries to be stored without deterioration and to be put into service after only a few hours of initial charging. Also exhibited are a number of sectioned cells of the company's traction batteries.

Dunlop Pneuride

Delaney Gallay shows a full range of fresh-air and recirculatory vehicle heaters on **Stand No. 224,** including a new three-way unit that has controllable fresh-air and recirculatory characteristics and pre-setting thermostatic temperature control. Combustion heaters and units for p.s.v. interior heating, a special taxicab heater, a variety of seat safety belts and examples of radiators, oil coolers, grilles and heat-insulation blankets made to special order are also displayed.

The **Dunlop** Pneuride air suspension system for commercial vehicles and the company's disc brakes are prominently featured on **Stand No. 369.** The Pneuride system, which is shown fitted to an A.E.C. Bridgemaster bus and a K-type Foden tractor elsewhere in the exhibition, is shown as a working exhibit on the stand to demonstrate its operating principles. Flexible pipes for power steering, fuel, oil and hydraulic systems are also on view and Dunlop also exhibits on **Stand No. 438** a range of rubber wings, corner panels and Dunlopillo cushioning for goods and passenger vehicles.

Edwards Bros. (Tippers), Limited, occupying **Stand No. 31,** is showing a useful new tailboard loader operated hydraulically by a newly developed **Edbro** hydraulic motor and control valve giving smooth positive control throughout the lifting range. The standard unit has a 15-cwt. capacity and larger sizes are available.

Various items of vehicle equipment displayed on **Stand No. 437** by Equipment and Engineering Co., Limited, include the **Notek** Reversascope—an underfloor mirror with viewing cover in the cab floor to give drivers a clear view of the road immediately behind the vehicle; shockproof rubber-mounted flashing direction indicators for side and rear fitting; and a range of all types of **ECO** route and destination indicators and gear featuring a new wide plasticised screen material that is claimed to be more resilient and durable, washable and to roll more accurately.

Of chief interest on **Stand No. 295** will be **Ferodo** friction pads for disc brakes and both Girling and Dunlop disc brakes are displayed. A special feature is made of the Girling brake similar to those fitted to the Midland "Red" fleet of buses, which have now covered an aggregate of over 22 million miles on Ferodo friction pads. Also shown as a fitted example of Ferodo materials for drum brakes is an A.E.C. Bridgemaster brake assembly and a comprehensive display of clutch facings, fan belts and non-slip coverings and nosings for bus stairways, platforms and gangways.

Heavy-Duty S-cam Brake

A new drum brake as fitted to a number of new heavy-duty vehicles in the exhibition is shown by the maker, **Girling,** Limited, on **Stand No. 312.** The new unit, which is produced for air-pressure operation in sizes of 15½ in. diameter by 4½ and 7 in. wide, with lining thickness of ¼ in., has lightweight steel shoes operated by S-form cams through friction-reducing rollers. The S cam gives uniform lift throughout the full range of cam movement and slack adjusters can be incorporated in the camshaft or camshaft levers. A pull-off spring detensioner is fitted to facilitate shoe removal.

Centrepiece of the Girling display, which covers every type of mechanical and hydraulic drum brake for commercial vehicles, is a motorised rear axle equipped with the latest-pattern hydraulic disc brakes at the hubs and a mechanical drum hand brake on the transmission. Hydraulic components shown include all brake parts, a slave cylinder for clutch operation and—a new development—a Girling hydraulic throttle control. The range of dampers includes a new unit named CSV (coil-spring valve), claimed to provide particularly long life with silent fade-free operation under the most arduous conditions. Spare and replacement parts for Girling and Bendix brakes and replacement dampers are shown by the associate company, Hydromechanics, on **Stand No. 313.**

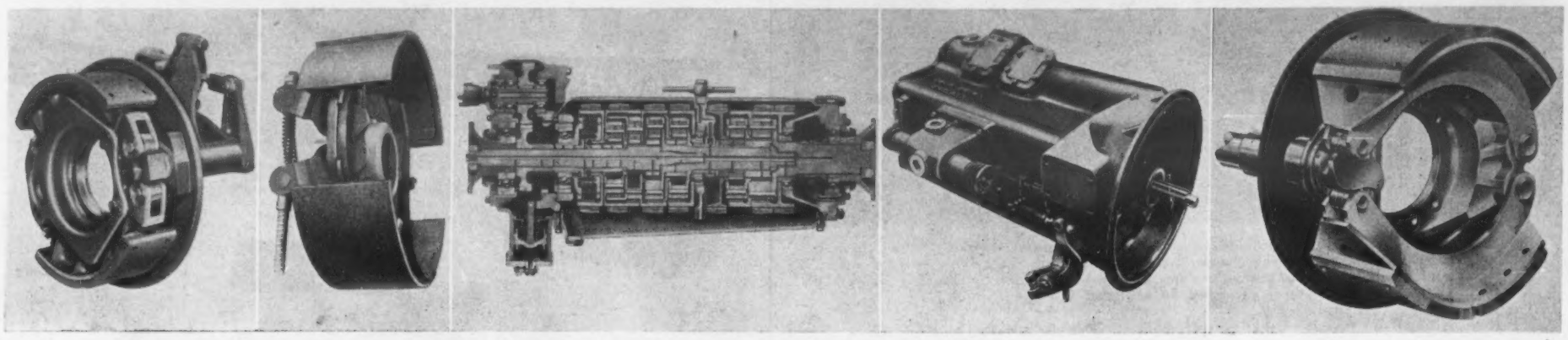
A useful service shown on **Stand No. 324** by Hepworth and Grandage is the **Hepolite** cylinder replacement kit set, each comprising one piston, one cylinder liner and the necessary sealing rings and gaskets. Also shown are Heplex low-expansion light-alloy, cast-iron and split-skirt pistons for all types of engines; Vacrom chromium-plated piston rings, including the new Hepocrom and KSS oil-control rings; examples of the Granolite surface treatment; a selection of Vacrit wet- and dry-type cylinder liners; and a wide range of gudgeon pins.

New Furnishing Fabrics

Two of the manufacturing divisions of **Imperial Chemical Industries** are represented—leathercloth and paints on **Stands No. 258 and 257** respectively—and the associated company **Amal** on **Stand No. 221.** The main exhibit on stand 258 is a luxury coach seat upholstered in Vynide and moquette while a panel illustrates three recent I.C.I. products, Hydex—a high-strength lightweight synthetic water- and rot-proof material suitable for lorry tilt covers and the like duties; Novon Ten—a decorative and abrasion-resistant foil for laminating with almost any type of material for coachwork panelling; and Vyweld—a new resilient form of quilting for luxurious coach interior finishing. All types of I.C.I. transport finishes, including Dulux 98 and Belco materials and processes and pretreatment systems, are illustrated on stand 257, while the Amal display comprises flowmeters, jet-calibrating machines, flame traps, fuel lift pumps and filters, bonnet fasteners, ball and roller joints and push-pull controls.

An estimated life of 200,000 miles for petrol-engine valves is forecast due to the introduction of an American-developed steel alloy 21-4NS, which can be seen on **Stand No. 280** in the form of experimental exhaust valves produced by **W. G. James,** Limited. The company also shows valves for petrol and diesel engines in a wide variety of materials and with numerous special seat and stem treatments.

(*To be continued*)



New Lockheed heavy-duty cam brake and 12 in. by 4 in. transmission brake; Self-Changing Gears RV30 eight-speed direct air-operated epicyclic gearbox; new David Brown 561 five-speed gearbox for 750 lb./ft. engine torque; and, extreme right, new Girling heavy-duty S-cam brake

41 Seater dual purpose all-metal single deck bus for W. Alexander & Sons

ALEXANDER BODIES

. . . chosen for all-round service

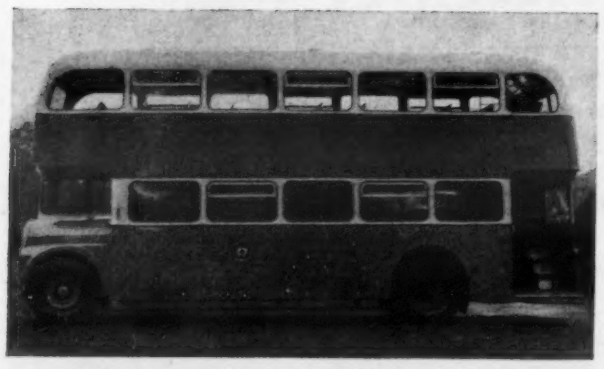
72 Seater front entrance all-metal double deck bus for Edinburgh Corporation

38 Seater Edinburgh-London 2-day all-metal coach for Scottish Omnibus Co.

Established over 25 years, we are manufacturers of all types of single deck and double deck vehicle bodywork.

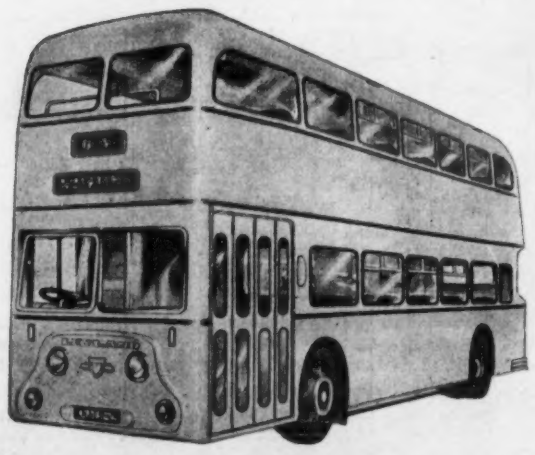
We would be glad to place our unique experience at YOUR disposal. . . .

37 Seater all-metal coach for Barton Transport



73 Seater rear entrance all-metal double deck bus for Glasgow Corporation

***At the Commercial Motor Show . . . don't miss the* 78-seater ALEXANDER-built body on the Leyland ATLANTEAN chassis . . . STAND 51!**



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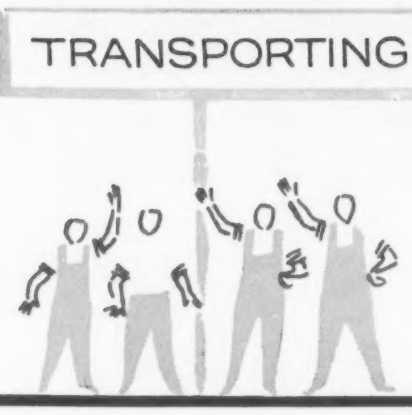
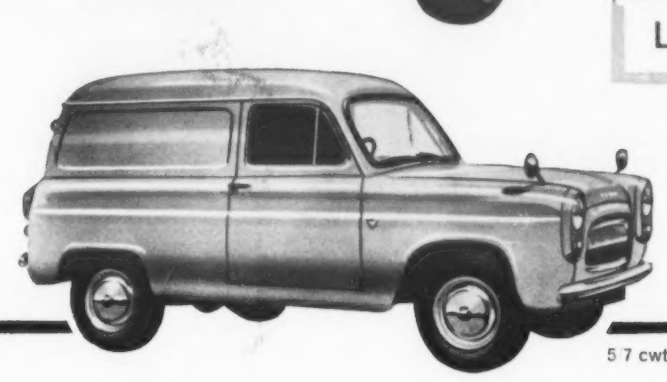
TRANSPORTING



Trader Trucks 30 cwt.-7 tons.

LIGHT DELIVERY

10/12 & 15 cwt. Vans & Chassis.



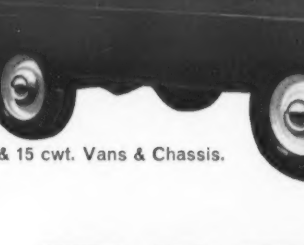
5/7 cwt. Vans.

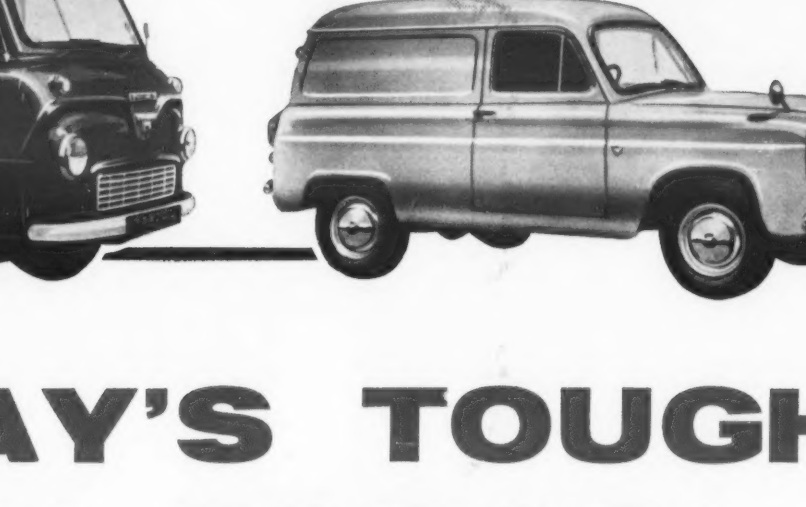
TODAY'S TOUGHEST TASK FORCE!

BUILDING

Trader Tippers 5 or 6 cubic yards.

HEAVY DELIVERY





Semi-forward control 2 ton Van (and Trucks 30 cwt.-4 tons).

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14 TON G.V.W

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- ★ **THORNYCROFT designed and manufactured 6-cylinder direct injection oil engine. 109 b.h.p. (net) at 1,800 r.p.m. 354 lb. ft. torque at 1,000 r.p.m.**

  Nitrided crankshaft with copper lead bearings.
- ★ **5-speed gearbox with optional overdrive.**
- ★ **Air pressure servo hydraulic brakes.**
- ★ **10¾″ deep flat topped frame (with six sturdy crossmembers) allowing a light body under frame to be used.**
- ★ **Power assisted steering (optional extra).**
- ★ **10-stud wheels with 10.00-20″ 14 ply tyres, twins rear including spare wheel and tyre.**
- ★ **21′ 6″ body length.**

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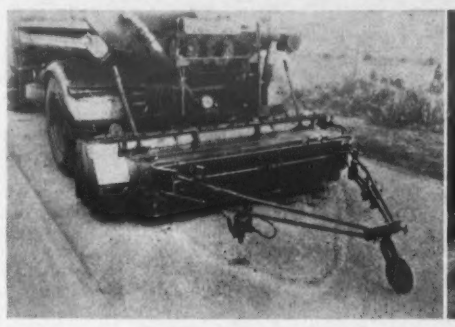
ROAD RESEARCH

Essential Adjunct to Healthy Transport Industry

TACKLING PROBLEMS OF RAPIDLY EXPANDING TRAFFIC

RESEARCH into the design, construction and use of roads and road vehicles is as vital as that concerned with any other nationally important technological or industrial development. Indeed, because road transport has direct or indirect effects on almost every one of man's modern activities and thus can affect adversely or favourably the general economic life of the country, the solution of problems that could hamper its healthy expansion might be considered more urgent than many on which far more time and money are expended.

Road research is complicated by the universality of the application of road transport; by its widely varying components, both vehicles and the people who use them; by the economic necessity for retaining in use a road system the major portion of which has developed more or less haphazardly and piecemeal to meet the needs of an earlier age; by the very magnitude of present traffic, which was estimated to have totalled about 55 thousand million vehicle miles in 1956; and by the remarkable rate of growth of road traffic. It is not generally realised how large a sum is spent annually on road transport. In 1956 this amounted to £2,000 million, equal to 13.5 per cent of the national income, with goods transport accounting for nearly half of this total. The road transport industry directly employs just over 2 million people, while time spent on road journeys to and from different places of employment occupies a proportion of the productive time of many other workers. The current rate of growth of road traffic is roundly 7 per cent and if this is continued, it is estimated that the present 7 million vehicles on the roads of Britain will be doubled in nine years.



Machine developed for spraying adhesion agent on roads in bad weather and, right, experimental surface in wet weather with and without adhesion agent. In the foreground it can be seen that traffic has removed chippings from untreated surface

Government Responsibility

Clearly, no government could remain indifferent to these facts and although successive British Governments have been criticised for their tardiness in embarking on a modern road-building programme, at least a start has now been made. What is perhaps far more important is that Government-sponsored road research has been going on for many years to help determine how the limited amount of money available in the past and the larger sums now being voted for road maintenance and development should be spent so as to be in the best interests of road transport and the country as a whole. Much of real practicable worth has resulted from the work of the responsible department and its activities are bound to assume greater importance as growth continues and traffic problems become more complex.

Road research is organised under the Lord President of the Council, who is responsible to the Cabinet, through a Privy Council Committee and the Department of Scientific and Industrial Research. This department finances research at universities and operates its own research establishments as well as financing jointly with the industries concerned trade research organisations (of which the Motor Industry Research Association is one example). The instrument of D.S.I.R. for direct research is the Road Research Laboratory, with establishments at Harmondsworth and Langley, near Slough, soon to be brought together it is hoped at a new 250-acre site at Crowthorne in Berkshire, where it will be possible to provide much-needed additional facilities.

The laboratory is under the control of the Director of Road Research and a principal advisory body, the Road Research Board, which appoints committees to deal with specific subjects. Close contact is maintained with the Ministry of Transport and Civil Aviation, local authorities and the police who, as the highway and traffic authorities, provide facilities for full-scale R.R.L. experiments, while some of them test procedures recommended by the laboratory to confirm their behaviour on roads in different areas. Co-operative researches are undertaken with the British Road Tar Association, the Road Bitumen Association, the Natural Rubber Development Board, the Cement and Concrete Association and the Chalk Lime and Allied Industries Research Association, and there is free interchange between the laboratory and the learned societies. There is also a Colonial Road Research Section which is providing substantial assistance to road and road transport development in various Commonwealth countries.

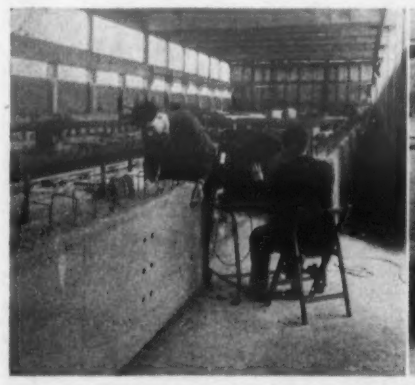
The Road Research Laboratory is at present organised into a headquarters and materials and construction division at Harmondsworth, a traffic and safety division at Langley and a Scottish branch at East Kilbride, near Glasgow. As well as making known the results of the main researches of the English divisions that are applicable to Scottish conditions, the Scottish branch investigates problems arising from the special character of climate and subsoils. The broad objective of research is to find ways of enabling traffic of all kinds to move safely, expeditiously, economically and comfortably. The major headings of traffic and safety research are roads; vehicles; and road users. Work under these headings is directed towards discovering and assessing the importance of those factors in road layout and design, in vehicle design and in the behaviour of road users which contribute to accidents and towards developing means for eliminating or reducing their effects.

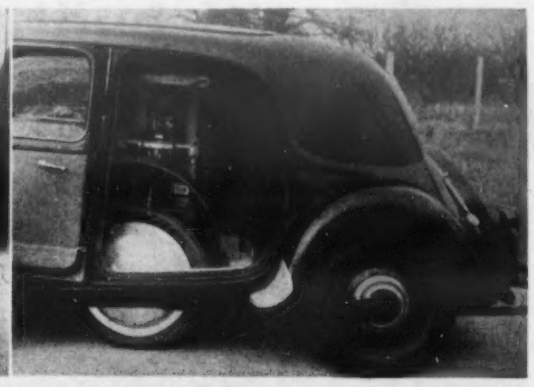
Reducing Operating Costs

The main heads of the work of the materials and construction division are soils; bituminous materials; and concrete. Materials and methods of construction are examined with the object of producing safer and more durable surfaces and of reducing the costs of construction and maintenance. In the more general research under the headings of economics and statistics, the movement and behaviour of traffic is studied with the object of improving road layout and design, promoting safe traffic flow and reducing the operating costs of road transport.

The Road Research Laboratory also operates a comprehensive information and advisory service which is available to road engineers and other interested parties. The library obtains all the important relevant literature published anywhere in the world, as well as many unpublished research notes, scrutinises, abstracts and makes translations where necessary and has available books, periodicals and pamphlets not easily obtainable elsewhere. Summaries of the more important published items appear in the monthly publication, *Road Abstracts*, which is obtainable from H.M. Stationery Office, while summaries of unpublished research notes are mailed directly to interested parties on request.

The work of the laboratory is reviewed and progress is outlined in an annual report comprising reports both of the Road Research Board and the Director of Road Research, the latest of which, *Road Research 1957*, was published by H.M.S.O. in July last. The board's report outlined plans for the period 1959-64, for which it recommended a considerable expansion of research on problems of traffic and safety; provision for a large programme of full-scale experiments on materials and methods of construction and for the formation of teams to demonstrate the improved techniques resulting from such research; extension of research into the design of flyover junctions and means of reducing the nuisance of traffic noise and vibration; and full and effective maintenance of the laboratory's valuable information and advisory services. The board considered that an overall expansion of 50 per cent of the present effort was the minimum desirable.





Electronic non-destructive testing of concrete; right, skid-testing car for measuring the slipperiness of roads

Help in Shaping Policy

Over the past few years part of the research programme had been aimed at establishing facts that would help those responsible for shaping policy and to this end the board encouraged the Institution of Civil Engineers to organise a conference on the highway needs of Great Britain last November (reported in MODERN TRANSPORT, November 23, 1957). Members of the board and officers of the laboratory had played leading parts in the conference, which had presented to a wide audience a constructive survey of the present position and future trends and given an opportunity to publicise the large volume of data resulting from research during the last 10 years. It also showed clearly the relentless pressure exerted by traffic growth and the magnitude of the measures required to meet it and accentuated the paucity of data on urban conditions, including distribution of traffic and parking demand, which had prompted a special recommendation to increase the emphasis on that aspect of the research programme. The conference had covered training in traffic engineering and the laboratory was helping universities to establish

(*Continued on page 22*)

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DISC Lockheed commercial vehicle disc brakes are available in two types, single and twin cylinder, each available with a variety of cylinder bore sizes, thus giving complete flexibility of front-to-rear braking ratio.

FEATURES:

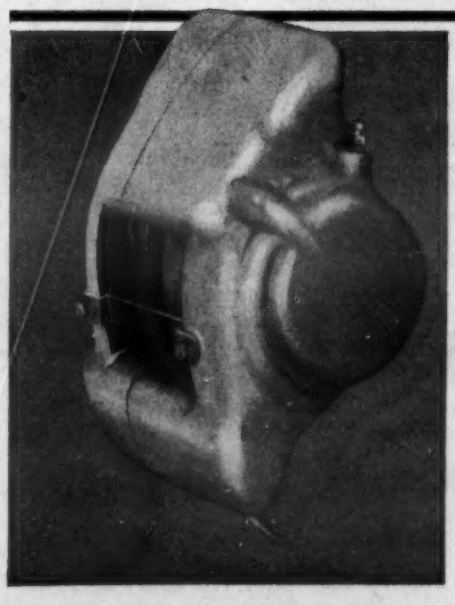
Automatic adjustment, giving constant pedal travel throughout the life of the friction pads.
Operator can inspect lining condition at a glance and remove pads in seconds.
Patents pending.

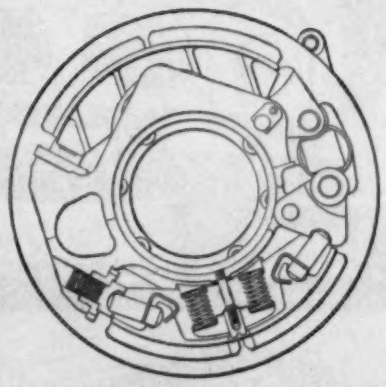
DRUM These new heavy-duty cam-type brakes have been developed specifically for vehicles grossing 14 tons and upwards, and for actuation by hydraulic, air or other means. They incorporate the following features:

Fully floating leading and trailing shoes.
Individual external adjustment for each shoe.
Very high standard of mechanical details to reduce friction and facilitate service.
Brake drum up to ¼" diameter oversize can be used.

In addition, there is the well-known range of Lockheed hydraulic brakes.

LOCKHEED HYDRAULIC
Regd. Trade Mark
DISC & DRUM BRAKES





LOCKHEED
HEAVY DUTY CAM BRAKES
AUTOMOTIVE PRODUCTS COMPANY LTD.
LEAMINGTON SPA · WARWICKSHIRE · ENGLAND

Road Research

(*Continued from page 21*)

facilities for study of this important subject as well as running its own courses.

Progress was reported by the panel set up to give precision to a method of assessing the cost of road schemes in relation to the benefits deriving from them; results would be published shortly and the modified method tried further wherever opportunity occurred. Because the main gap in knowledge on the physical aspect of road construction was in pavement design, the latest and most comprehensive of the 200 or so full-scale experiments which the laboratory had under observation, the construction of which was now completed on 2½ miles of new road on A1 at Alconbury Hill, was particularly welcomed. This would enable for the first time flexible and rigid pavement designs to be tested on this scale under directly comparable conditions of heavy traffic and subsoil. The board had been pressing for such large-scale experiments for 10 years and stressed that in the vast project of modernising the country's roads, it was necessary to provide sites for these in the early stages if the information they could provide was to be effective.

Slough Experiment

The board's committees on vehicles and road users (a joint committee of the Road Research Board and the Medical Research Council) were following the study of crash injuries now being made by the laboratory, with the co-operation of the police, in the Slough, Windsor and Staines areas. Important facts were emerging and extra effort in these studies was recommended. Of the two-year experiment at Slough, which comprised changes in road layout and traffic control (mainly linked traffic lights with special facilities for crossing pedestrians) and new forms of propaganda, training and education as well as a voluntary vehicle-inspection scheme, on which the M.T.C.A. published a report earlier this year, the board said encouraging results were produced. There was a reduction in pedestrian casualties and the total of fatal and serious casualties was nearly 20 per cent less than it would have been if it had followed the national trend. Improvements noted in the behaviour of road users suggested that a number of the measures used could profitably be intensified elsewhere.

Many facts and figures established by research, of inestimable value in assessing the economic effects of road building and improvements and therefore of allotting priorities, are contained in the director's report for 1957. A survey indicated that only one per cent of the whole road system carried 25 per cent of traffic and 10 per cent carried 60 per cent of traffic, so that a large proportion of traffic could be affected by improving a small proportion of the total road mileage. The importance of reducing delays to road vehicles was illustrated by the facts that 27 per cent of total vehicle-mileage was performed by commercial vehicles; 50 per cent of the drivers of private cars travelling between London and Birmingham and, in London, 27 per cent of car drivers, 22 per cent of taxi occupants and 5 per cent of bus passengers were travelling on business; a reduction in speed from 20 to 10 m.p.h. due to congestion in Central London increased fuel consumption by about 50 per cent; and tests comparing car fuel consumption on a rural trunk road with that under motorway conditions suggests that the same steady speed on the motorway as that possible on the ordinary road would save 24 per cent in fuel consumption, while an increase in motorway speed to consume the same amount of fuel as on the trunk road would reduce journey time by 25 to 40 per cent.

It was estimated that in 1956, about 25,000 million vehicle-miles were covered in urban areas at an average speed of about 20 m.p.h. and about 30,000 million in rural areas at about 32 m.p.h. average speed. Making no allowance for non-working time, there would be estimated annual savings of £7 million in rural areas and £29 million in urban areas if traffic could be speeded up by 1 m.p.h.; if the speed of traffic under congested conditions could be raised to that under light-traffic conditions, there would be a total annual saving of £170 million while, if non-working time was added, the estimated total cost of congestion was £510 million. This cost was now increasing at twice the rate of traffic growth.

Machine developed for the stabilisation of soil with Portland cement. It pulverises the soil, mixes cement with it and compacts the mixture to a hard firm material

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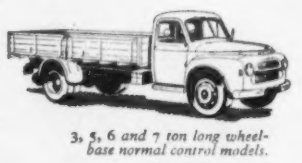

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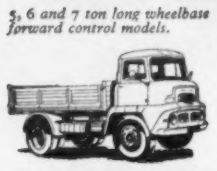
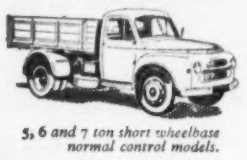


5, 6 and 7 ton short wheelbase forward control models.



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TRAILERS FOR THE WORLD

Originality Characterises Crane Designs (Cont.)*

SOME FEATURES OF CURRENT PRODUCTION VEHICLES

RATIONALISATION in the design of Crane standard types of trailer has helped to keep production costs to a minimum as well as to simplify maintenance where trailers of various types are employed. This rationalisation embraces the standardisation of such proprietary components as Girling brakes, Timken tapered roller and S.K.F. parallel roller and ball bearings and Clayton Dewandre vacuum or air-pressure brake servos, and a number of Crane-produced components and assemblies which are common to both independent and articulated trailers of similar capacity. All independent trailers are equipped with the Crane patented ball-bearing turntable and most semi-trailers can be fitted with the standard kingpin fifth-wheel coupling or with Crane or other type of automatic coupling. Many of the standard designs are available with quickly

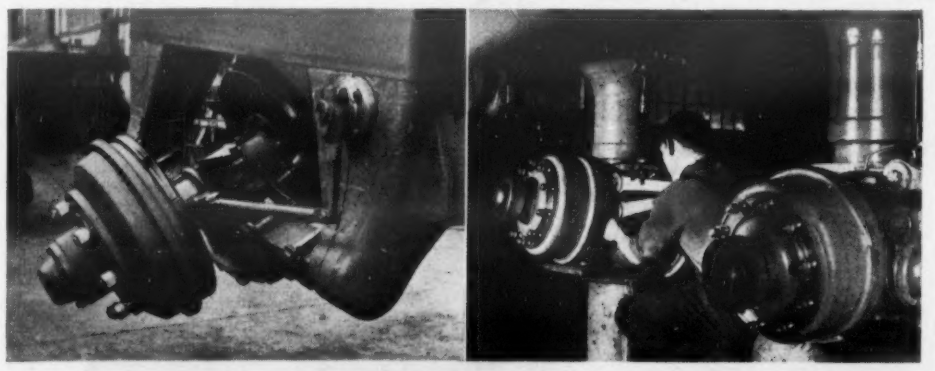
The Crane 200-ton capacity hydraulic-suspension trailer described in the text

incorporated alternative equipment to make them suitable for particular purposes or conditions and all are designed to take various types of bodywork and for dismantling and packing for economical shipment overseas.

Among the standard designs are two-axle full trailers with capacities from 5 to 8 tons, single-axle semi-trailers with capacities of 5-6, 8 and 10-12 tons respectively and an 8-10 ton capacity cranked machinery carrier with detachable rear axle for easy loading, which is available both in independent and semi-trailer form. All these vehicles employ through axles carried on semi-elliptic laminated springs incorporating the Crane patent progressive buffer mountings. In this design there are no spring eyes or shackles, the squared-off ends of the springs being fitted into specially shaped steel shoes bolted to the frame. Due to the shape of the shoes, deflection of the spring under load has the effect of reducing its span, thus increasing its strength and providing sensibly progressive rate suspension. Positive end-wise location is obtained by rubber blocks inside the slipper shoes, which are resilient enough to permit spring extension under deflection.

This method of spring mounting has other points to commend it. Spring breakages are reduced and to dismantle the assembly it is only necessary to unbolt and withdraw one shoe on each side. In fact, the cranked trailer and semi-trailer with the quickly removable rear axle makes removal even more simple. The rearmost spring shoes are fitted with a simple locking device which, when released, permits the shoes to be swung clear of the spring ends and the axle and springs, complete with mud-guards, to be withdrawn from the forward shoes.

120-140 ton solid-tyred bogies for carrying particularly long loads; right, a patented trailing-arm-bogie semi-trailer for 16-17 ton loads



Trunnion-ended spring mounting for in-line wheels on trailers and semi-trailers and, right, axle assemblies of the large hydraulic-suspension bogies

Trunnion-Ended Springs

The 16-tyre low-loading trailers for loads of 10 and 13 tons, which have unladen floor heights of 2 ft. 9½ in. and 3 ft. respectively, and the eight-wheeled 15-ton trailer are also standard productions incorporating Crane patent trunnion-ended springs. This form of suspension provides a low pivoting centre for oscillating axles and even load distribution on trailers having four wheels in line. It employs laminated steel springs, which are almost flat and have the ends cut off square. One spring is mounted below each rocking axle and its squared ends are fitted into recesses in trunions which are free to rotate in bushed pivot brackets carried on the trailer frame. It will thus be seen that the spring, complete with oscillating axle, is free to pivot about its longitudinal axis, permitting the wheels to follow ground contours without twisting the springs, while the almost vertical wheel movement reduces tyre scrub.

A similar system is applied to the heavier classes of cranked trailers and semi-trailers having four wheels in line, which are produced in capacities of 15 to 30 tons and 45-65 tons, and to 15-20 ton low-loading trailers which in the 20-ton size has a laden deck height of only 2 ft. 9 in. This system also provides the facility of easy axle removal for rear-end loading.

The 45-65 ton trailer is a compact vehicle weighing under 14 tons unladen, designed to comply with current regulations covering vehicles carrying heavy indivisible loads. It does not exceed 9 ft. 6 in. in width, is fully sprung and has pneumatic tyres, and therefore qualifies for the 12-m.p.h. speed limit when the gross combined weight does not exceed 75 tons and the load is not overwidth. At its maximum load of 65 tons, the gross weight would obviously bring it into the 5-m.p.h class, but its generally clean lines and moderate tare make it a versatile vehicle for economical handling of widely varying types of load. All of these trailers are fitted with the necessary jacking points and jacks, various loading ramps and winches are available.

Beam Suspension

As well as with four wheels in line, when the maximum load is over 20 tons, the Crane special low-loaders with small wheels and tyres at the back are also built with tandem rear axles on sprung or unsprung beam suspension units and with multi-wheel forecarriages, having carrying capacities of up to 70 tons. The patented Crane beam suspension system has been developed to provide full articulation and even load distribution in all types of eight-wheeled bogies for high-capacity trailers. It can be adapted to suit any size of pneumatic or solid tyre and is in fact used in many of the Crane special-purpose trailers varying in capacity from 10 to 140 tons.

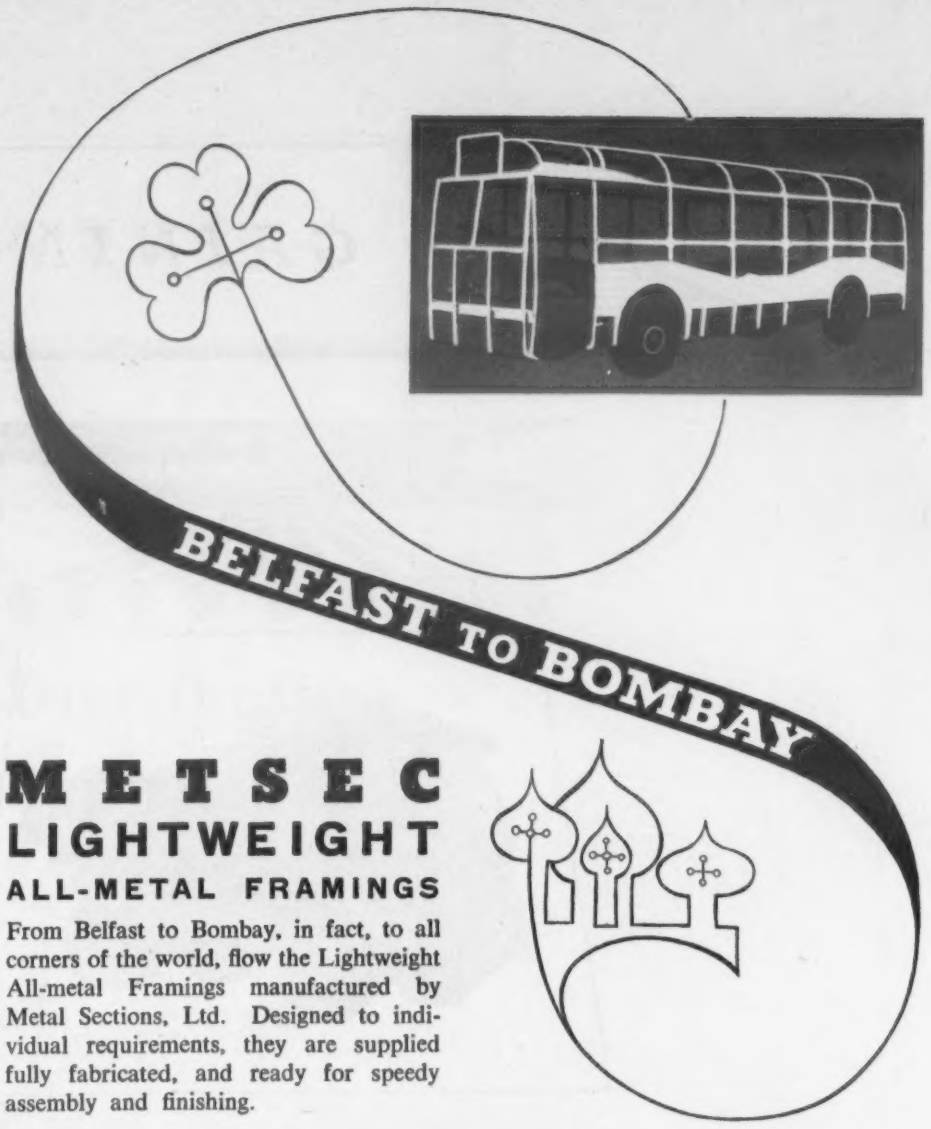
The system employs two fabricated tubular rocker beams that pivot on a cross shaft fixed to the frame. Each of the rocker beams carries a short centrally pivoted axle at each end for two wheels. It will thus be seen that the whole assembly provides two rows of four wheels, which can be twin tyred when necessary, all mounted on the cross shaft and free to follow ground contour. The system differs from the orthodox in that the normal rocking-axle bushes have been replaced by widely spaced self-aligning roller bearings fully protected from dirt and sealed against oil leakage. The advantages claimed for the system are easier axle oscillation, practical elimination of end play and side play by virtue of the length of axle supports and reduction of wear and maintenance.

The Crane sprung tandem-axle suspension units are available in three forms employing normal through axles, the radius-arm arrangement or the trailing-axle layout and one or other of these forms is employed in most Crane maximum-capacity bogie haulage trailers and semi-trailers and in some special types requiring four-wheeled bogies. The through-axle type uses two laminated springs, each centrally pivoted on a cross shaft attached to the trailer frame. The two ends of each spring are anchored in housings bolted to the full-width axles which incorporate rubber pads to provide torsional flexibility in cross articulation

In the radius-arm design, the four stub axles are carried on independent radius arms which pivot on a common cross shaft so that two of the arms extend forwards and two backwards. On each side a semi-elliptic spring is clamped at its centre to one of the radius arms and its two ends register in brackets over the stub axles. Thus, an upward force on one wheel both deflects the spring and tends to force the other wheel on that side downwards. Features of the system are that stability is independent of spring centres, depending only on the wheel track dimensions and that

(*Continued on page 26*)

* The first part appeared in our last issue.



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Road Research

(*Continued from page 21*)

facilities for study of this important subject as well as running its own courses.

Progress was reported by the panel set up to give precision to a method of assessing the cost of road schemes in relation to the benefits deriving from them; results would be published shortly and the modified method tried further wherever opportunity occurred. Because the main gap in knowledge on the physical aspect of road construction was in pavement design, the latest and most comprehensive of the 200 or so full-scale experiments which the laboratory had under observation, the construction of which was now completed on 2½ miles of new road on A1 at Alconbury Hill, was particularly welcomed. This would enable for the first time flexible and rigid pavement designs to be tested on this scale under directly comparable conditions of heavy traffic and subsoil. The board had been pressing for such large-scale experiments for 10 years and stressed that in the vast project of modernising the country's roads, it was necessary to provide sites for these in the early stages if the information they could provide was to be effective.

Slough Experiment

The board's committees on vehicles and road users (a joint committee of the Road Research Board and the Medical Research Council) were following the study of crash injuries now being made by the laboratory, with the co-operation of the police, in the Slough, Windsor and Staines areas. Important facts were emerging and extra effort in these studies was recommended. Of the two-year experiment at Slough, which comprised changes in road layout and traffic control (mainly linked traffic lights with special facilities for crossing pedestrians) and new forms of propaganda, training and education as well as a voluntary vehicle-inspection scheme, on which the M.T.C.A. published a report earlier this year, the board said encouraging results were produced. There was a reduction in pedestrian casualties and the total of fatal and serious casualties was nearly 20 per cent less than it would have been if it had followed the national trend. Improvements noted in the behaviour of road users suggested that a number of the measures used could profitably be intensified elsewhere.

Many facts and figures established by research, of inestimable value in assessing the economic effects of road building and improvements and therefore of allotting priorities, are contained in the director's report for 1957. A survey indicated that only one per cent of the whole road system carried 25 per cent of traffic and 10 per cent carried 60 per cent of traffic, so that a large proportion of traffic could be affected by improving a small proportion of the total road mileage. The importance of reducing delays to road vehicles was illustrated by the facts that 27 per cent of total vehicle-mileage was performed by commercial vehicles; 50 per cent of the drivers of private cars travelling between London and Birmingham and, in London, 27 per cent of car drivers, 22 per cent of taxi occupants and 5 per cent of bus passengers were travelling on business; a reduction in speed from 20 to 10 m.p.h. due to congestion in Central London increased fuel consumption by about 50 per cent; and tests comparing car fuel consumption on a rural trunk road with that under motorway conditions suggests that the same steady speed on the motorway as that possible on the ordinary road would save 24 per cent in fuel consumption, while an increase in motorway speed to consume the same amount of fuel as on the trunk road would reduce journey time by 25 to 40 per cent.

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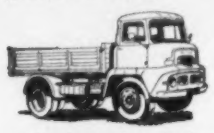

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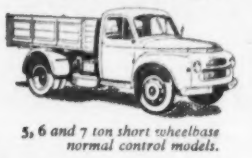

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SOME FEATURES OF CURRENT PRODUCTION VEHICLES

RATIONALISATION in the design of Crane standard types of trailer has helped to keep production costs to a minimum as well as to simplify maintenance where trailers of various types are employed. This rationalisation embraces the standardisation of such proprietary components as Girling brakes, Timken tapered roller and S.K.F. parallel roller and ball bearings and Clayton Dewandre vacuum or air-pressure brake servos, and a number of Crane-produced components and assemblies which are common to both independent and articulated trailers of similar capacity. All independent trailers are equipped with the Crane patented ball-bearing turntable and most semi-trailers can be fitted with the standard kingpin fifth-wheel coupling or with Crane or other type of automatic coupling. Many of the standard designs are available with quickly

The Crane 200-ton capacity hydraulic-suspension trailer described in the text

incorporated alternative equipment to make them suitable for particular purposes or conditions and all are designed to take various types of bodywork and for dismantling and packing for economical shipment overseas.

Among the standard designs are two-axle full trailers with capacities from 5 to 8 tons, single-axle semi-trailers with capacities of 5-6, 8 and 10-12 tons respectively and an 8-10 ton capacity cranked machinery carrier with detachable rear axle for easy loading, which is available both in independent and semi-trailer form. All these vehicles employ through axles carried on semi-elliptic laminated springs incorporating the Crane patent progressive buffer mountings. In this design there are no spring eyes or shackles, the squared-off ends of the springs being fitted into specially shaped steel shoes bolted to the frame. Due to the shape of the shoes, deflection of the spring under load has the effect of reducing its span, thus increasing its strength and providing sensibly progressive rate suspension. Positive end-wise location is obtained by rubber blocks inside the slipper shoes, which are resilient enough to permit spring extension under deflection.

This method of spring mounting has other points to commend it. Spring breakages are reduced and to dismantle the assembly it is only necessary to unbolt and withdraw one shoe on each side. In fact, the cranked trailer and semi-trailer with the quickly removable rear axle makes removal even more simple. The rearmost spring shoes are fitted with a simple locking device which, when released, permits the shoes to be swung clear of the spring ends and the axle and springs, complete with mud-guards, to be withdrawn from the forward shoes.

Trunnion-Ended Springs

The 16-tyre low-loading trailers for loads of 10 and 13 tons, which have unladen floor heights of 2 ft. 9½ in. and 3 ft. respectively, and the eight-wheeled 15-ton trailer are also standard productions incorporating Crane patent trunnion-ended springs. This form of suspension provides a low pivoting centre for oscillating axles and even load distribution on trailers having four wheels in line. It employs laminated steel springs, which are almost flat and have the ends cut off square. One spring is mounted below each rocking axle and its squared ends are fitted into recesses in trunions which are free to rotate in bushed pivot brackets carried on the trailer frame. It will thus be seen that the spring, complete with oscillating axle, is free to pivot about its longitudinal axis, permitting the wheels to follow ground contours without twisting the springs, while the almost vertical wheel movement reduces tyre scrub.

A similar system is applied to the heavier classes of cranked trailers and semi-trailers having four wheels in line, which are produced in capacities of 15 to 30 tons and 45-65 tons, and to 15-20 ton low-loading trailers which in the 20-ton size has a laden deck height of only 2 ft. 9 in. This system also provides the facility of easy axle removal for rear-end loading.

The 45-65 ton trailer is a compact vehicle weighing under 14 tons unladen, designed to comply with current regulations covering vehicles carrying heavy indivisible loads. It does not exceed 9 ft. 6 in. in width, is fully sprung and has pneumatic tyres, and therefore qualifies for the 12-m.p.h. speed limit when the gross combined weight does not exceed 75 tons and the load is not overwidth. At its maximum load of 65 tons, the gross weight would obviously bring it into the 5-m.p.h class, but its generally clean lines and moderate tare make it a versatile vehicle for economical handling of widely varying types of load. All of these trailers are fitted with the necessary jacking points and jacks, various loading ramps and winches are available.

Beam Suspension

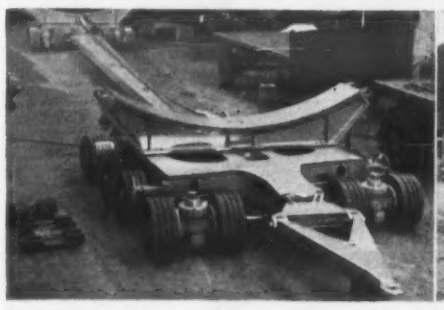
As well as with four wheels in line, when the maximum load is over 20 tons, the Crane special low-loaders with small wheels and tyres at the back are also built with tandem rear axles on sprung or unsprung beam suspension units and with multi-wheel forecarriages, having carrying capacities of up to 70 tons. The patented Crane beam suspension system has been developed to provide full articulation and even load distribution in all types of eight-wheeled bogies for high-capacity trailers. It can be adapted to suit any size of pneumatic or solid tyre and is in fact used in many of the Crane special-purpose trailers varying in capacity from 10 to 140 tons.

The system employs two fabricated tubular rocker beams that pivot on a cross shaft fixed to the frame. Each of the rocker beams carries a short centrally pivoted axle at each end for two wheels. It will thus be seen that the whole assembly provides two rows of four wheels, which can be twin tyred when necessary, all mounted on the cross shaft and free to follow ground contour. The system differs from the orthodox in that the normal rocking-axle bushes have been replaced by widely spaced self-aligning roller bearings fully protected from dirt and sealed against oil leakage. The advantages claimed for the system are easier axle oscillation, practical elimination of end play and side play by virtue of the length of axle supports and reduction of wear and maintenance.

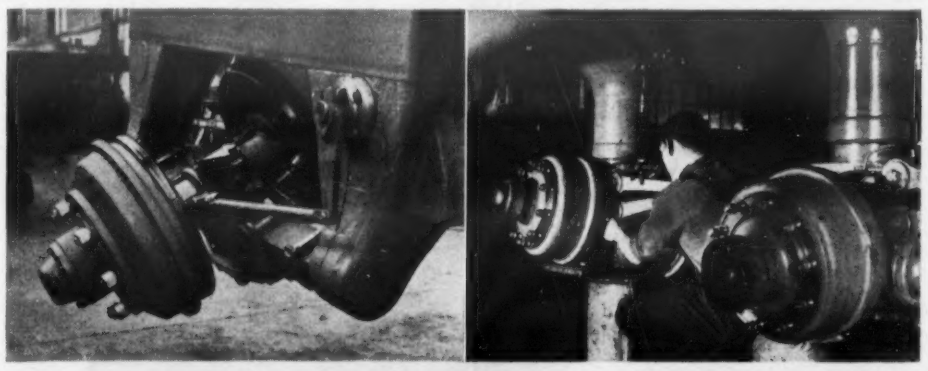
The Crane sprung tandem-axle suspension units are available in three forms employing normal through axles, the radius-arm arrangement or the trailing-axle layout and one or other of these forms is employed in most Crane maximum-capacity bogie haulage trailers and semi-trailers and in some special types requiring four-wheeled bogies. The through-axle type uses two laminated springs, each centrally pivoted on a cross shaft attached to the trailer frame. The two ends of each spring are anchored in housings bolted to the full-width axles which incorporate rubber pads to provide torsional flexibility in cross articulation

In the radius-arm design, the four stub axles are carried on independent radius arms which pivot on a common cross shaft so that two of the arms extend forwards and two backwards. On each side a semi-elliptic spring is clamped at its centre to one of the radius arms and its two ends register in brackets over the stub axles. Thus, an upward force on one wheel both deflects the spring and tends to force the other wheel on that side downwards. Features of the system are that stability is independent of spring centres, depending only on the wheel track dimensions and that

(*Continued on page 26*)

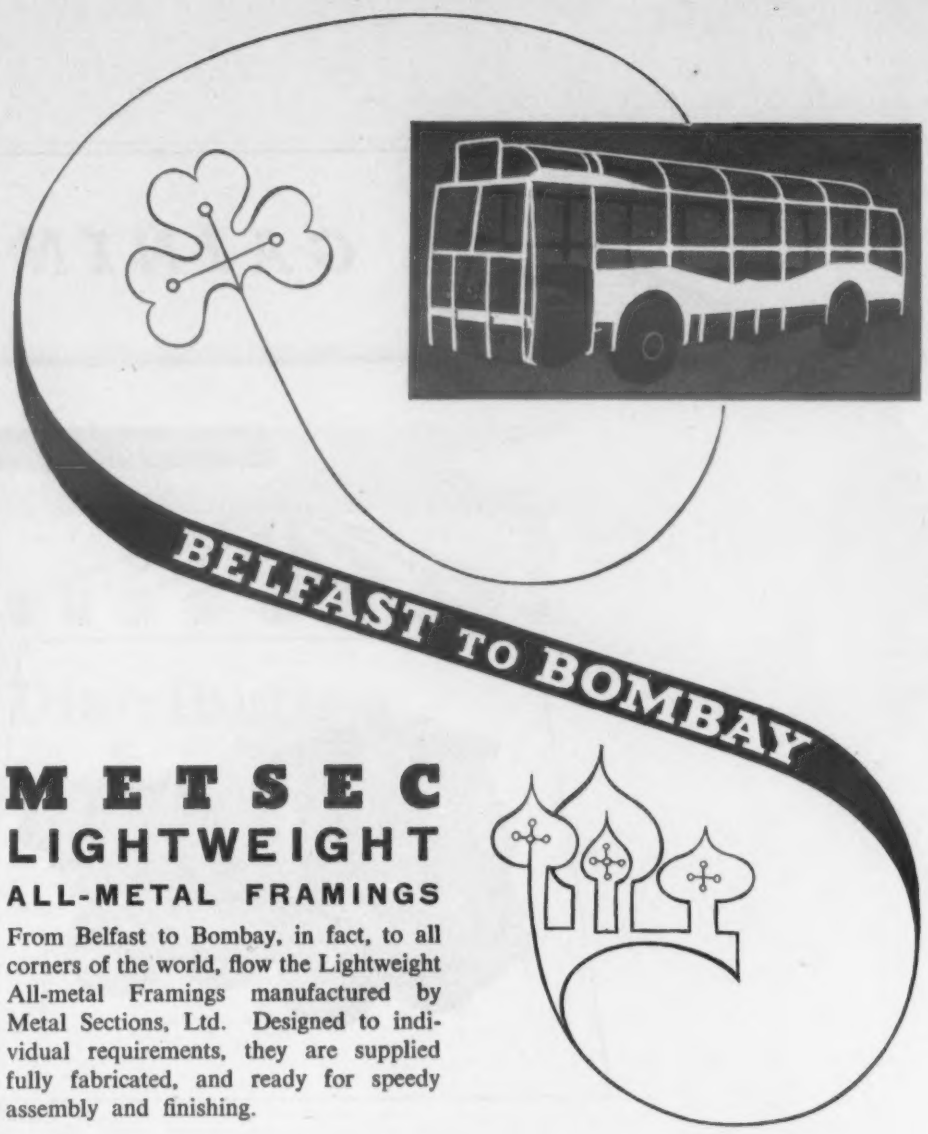


120-140 ton solid-tyred bogies for carrying particularly long loads; right, a patented trailing-arm-bogie semi-trailer for 16-17 ton loads



Trunnion-ended spring mounting for in-line wheels on trailers and semi-trailers and, right, axle assemblies of the large hydraulic-suspension bogies

* The first part appeared in our last issue.



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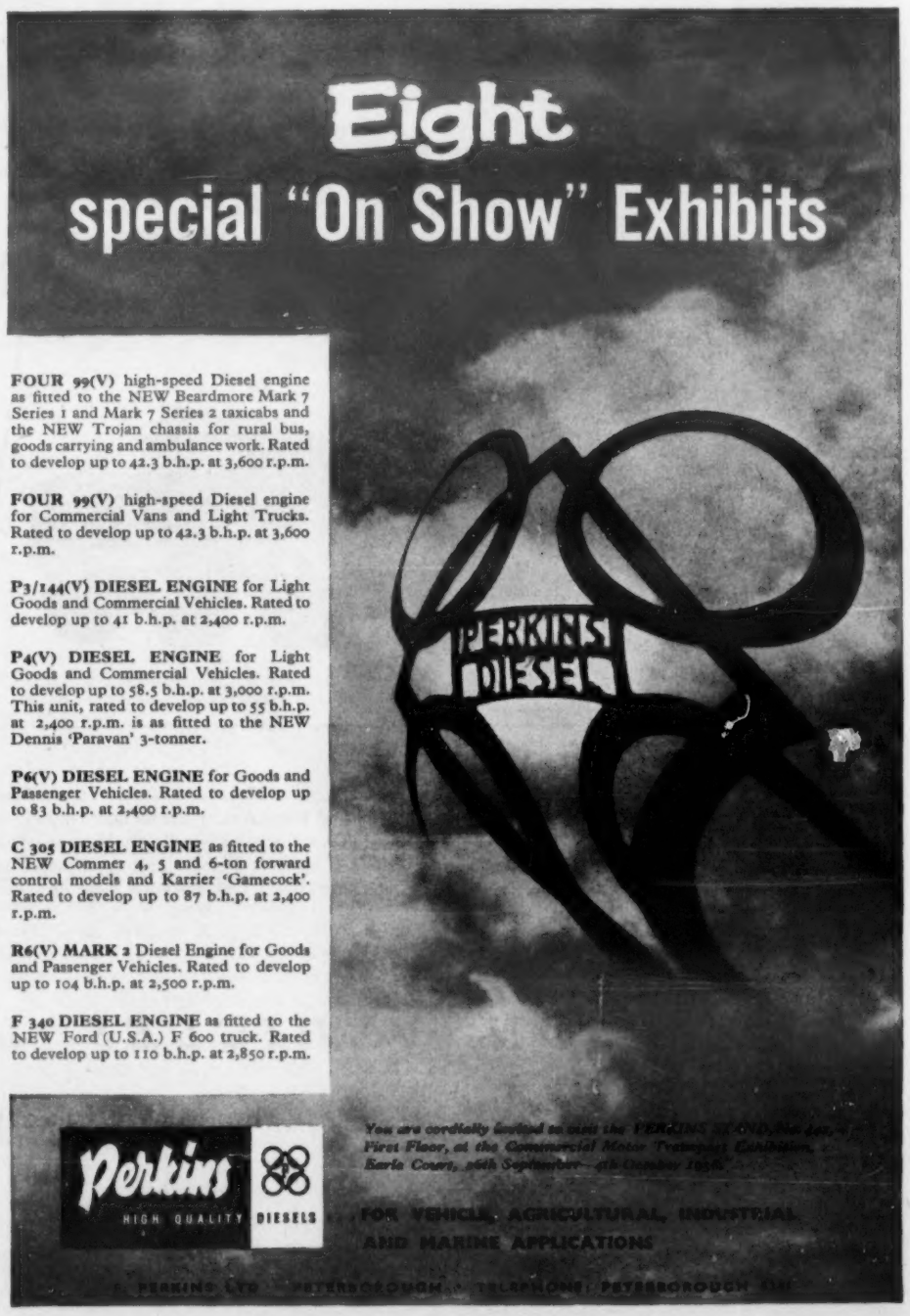
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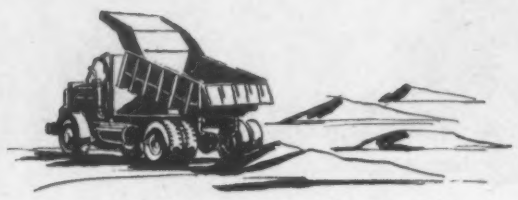
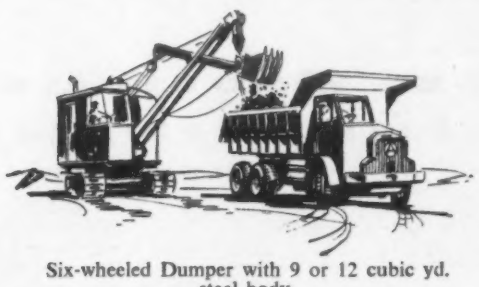


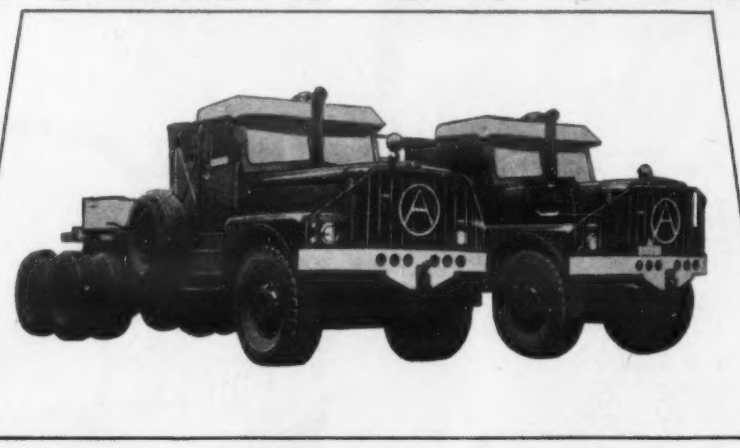
Four-wheeled Dumper with 6 cubic yd. electrically welded steel body.

Model DT 1366 six-wheeled Dumper



Six-wheeled Dumper with 9 or 12 cubic yd. steel body.

"Omega" 6 x 6 Tractors



The "Omega" can be supplied as either a 6×6 or 6×4 Tractor, Freighter, Tipper or Earth Moving Vehicle.

In addition to the specialised vehicles illustrated above, the Atkinson range of normal road vehicles covers 4, 6 and 8-wheeled Freighters, Tractors and Tippers, each model offering a wide choice of ancillary equipment that will give each individual operator the most economical running for his particular duties. It also includes a single and double-deck passenger range. Atkinson "Rangeability" really means something. Contact your local distributor for the fullest details.

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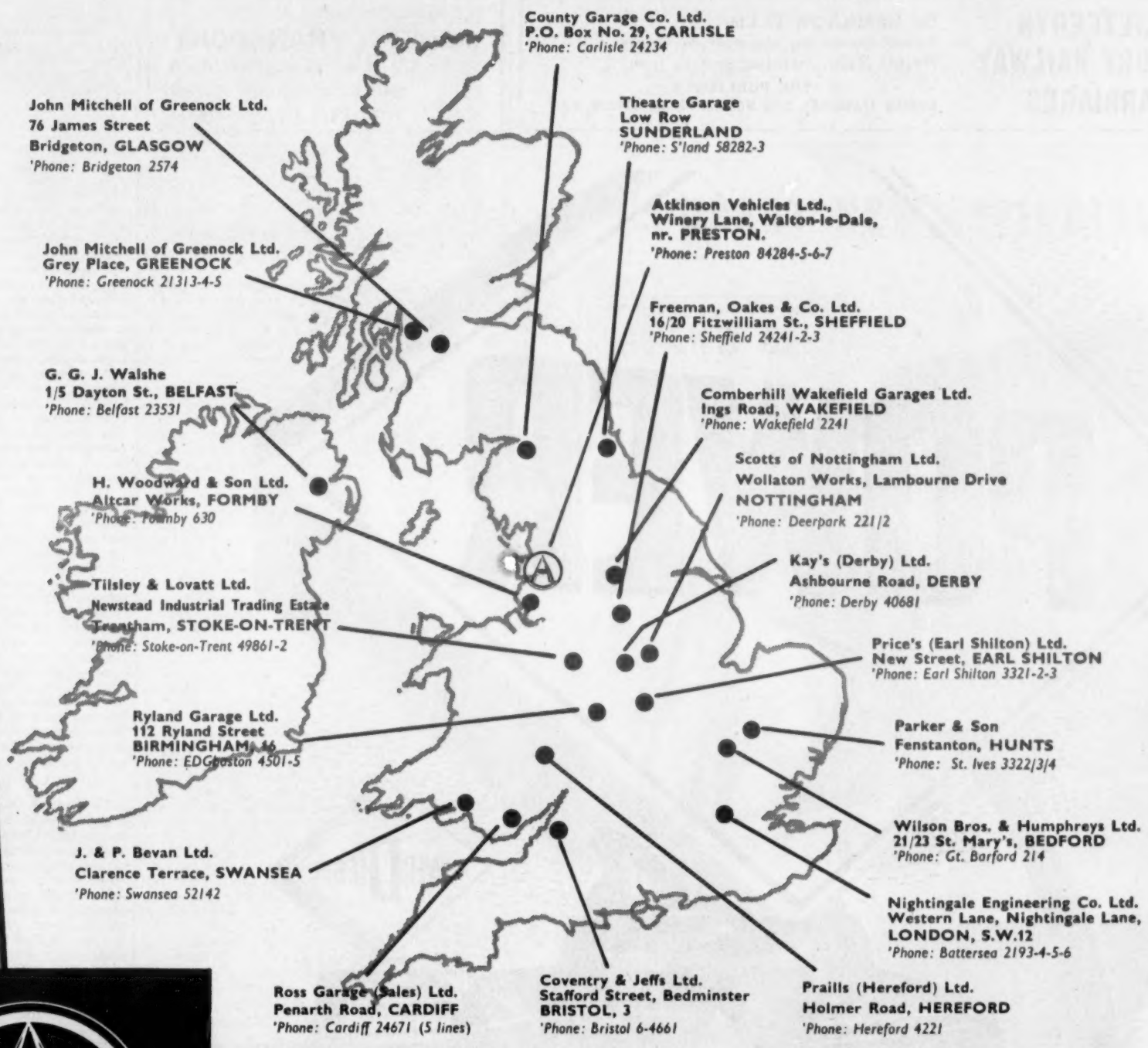

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TRAILERS FOR THE WORLD

(*Continued from page 23*)

the springs are relieved of all but vertical loads. In a developed radius arm design an independent spring centre pivot gives greater flexibility.

The third tandem-axle design is the trailing-arm type, which also possesses the features of stability independent of spring centres and independent suspension of each wheel, with the springs subject only to imposed vertical loads. It has a further advantage in that all four radius arms pivot on two separate cross shafts forward of the wheels, thus obviating any tendency for the leading wheels of a bogie to dig in over rough ground. The design was first developed in unsprung form for tank-recovery trailers, in which it proved extremely successful, and the later incorporation of semi-elliptic springs interacting between the two radius arms on each side made it suitable for a wider ranges of uses.

Pneumatic Suspension

This design is used extensively in semi-trailers of 16-17 tons capacity, in which it provides an exceptionally stable ride. It has also been developed to incorporate pneumatic suspension units in place of the steel springs in the Crane Airtrail semi-trailer, as we described in our issue of March 15 last. With only two circular convoluted-bellows units, instead of the long units necessary in a conventional bogie suspension, the Airtrail appears to be an extremely promising and economical system. The basic trailing-arm design already relieves the springs of all but vertical loads so that there is a refreshing absence in the Airtrail of all those rather weighty additional arms and members found necessary to provide for brake torque reaction and the various transverse and lateral loads in pneumatic systems developed from orthodox laminated-spring bogies.

The huge load carriers based on pneumatic tyres and Crane hydraulic suspension undoubtedly represent the acme of the trailer engineer's art. The system is applied to bogies having eight, 12, 16 or more wheels, the wheel arrangement and tyres being suited to a particular application for trailers with capacities for 90 tons upwards. The largest so far have been the 200-ton vehicle based on two 12-wheeled bogies, built for B.R.S. (Pickfords) in 1953, and a 180-200 ton trailer supplied to R. Wynn and Sons, Newport, Mon. A brief description of the 200-ton Pickfords trailer which follows will serve to illustrate the general design of this section of the Crane range.

120-ton Bogies

The trailer has a clear deck length of 30 ft. and an overall length of about 80 ft. on two 12-wheeled bogies each with a wheelbase of 10 ft. 6 in. The fabricated sidemembers of the load-carrying main frame are attached to the swan-neck end units by bullet-nose fittings, one of the two junction methods—bullet-nose and shovel-mouth—developed by Cranes to ensure true registration with quick dismantlement and assembly for loading. The flanged tubular crossmembers are so designed that the width between the sidemembers can be adjusted in stages between 7 ft. and 14 ft. to suit varying loads. Frame height above the ground is also adjustable by means of variable-angle flanged connections between the swan necks and frame-end members and, at any setting, frame height can be increased to give clearance over humps and obstacles on the road by raising the general level of the hydraulic suspension units. The swan necks are supported on the bogies by turntables and connected by rocker pins mounted in self-aligning bearings, each assembly being designed to accommodate a loading of 120 tons.

The two identical bogies each have three rows of twin-wheel rocking axles carried by six hydraulic suspension units having a bore of 9 in. and stroke of 18 in. Each of the Crane bogies has a hydraulic system designed according to the number of wheels used and its purpose to provide even loading of all wheels, stability and compensation for road irregularities. In eight-wheeled bogies, for example, effective compensation is provided by allowing free flow of hydraulic fluid between the suspension cylinders on the same side of a bogie, but in the 12-wheeled bogies a measure of three-point suspension is necessary. This is effected by permitting the four inner units of each bogie to oscillate to ground contour while the two outer units nearest the drawbar ends have cross compensation, which can be limited by means of a hand-wheel valve when necessary under conditions of high load and rough ground.

Stability Control

To prevent excessive fore-and-aft tilting of the bogies due to weight transference on gradients and during brake applications, special restraining units, comprising cylinders packed with Belleville spring plates, are fitted between each bogie and swan neck. Excessive sideways tilting of the bogies which might occur when the bogies are at an acute steering angle to the trailer frame is prevented by an automatic valve on each bogie which arrests the flow of fluid between the four outer suspension units when the steering angle exceeds 30 deg.

Steering of the bogies has been designed to give a true Ackerman movement and thus obviate tyre scrub. The centre wheels of each bogie are not steered but the leading and trailing wheels in each case are steered through opposite angles by a system of splayed levers, actuated on the leading bogie by a vertical steering post connected to the drawbar and on the trailing bogie, automatically by a kingpin and lever through the angular relation between the trailer main frame and rear bogie. The settings are such as to ensure that the rear bogie follows the path of the leading bogie but since in particularly long vehicles of this type in restricted spaces, independent steering control of the rear bogie is necessary, additional steering movement is provided by hydraulic steering cylinders which can be operated from a steersman's position over each drawbar. The mechanical steering push-pull rod is spring loaded so that additional hydraulic steering can usually be carried out without uncoupling the automatic steering. When a rear tractor is used it is coupled to push on a jaw immediately above the normal drawbar connection, which permits the automatic steering of the rear bogie to function normally and also steers the rear tractor automatically.

Each bogie is equipped with a 10-h.p. diesel-electric generator to power two 2-h.p. motors coupled to hydraulic pumps. Both motors are used together to raise the loaded trailer by means of the hydraulic suspension units but only one motor need be used to work the hydraulic steering. All wheels of the trailer are fitted with 15½-in. by 7-in. Girling two-leading-shoe brakes operated by air pressure through relay valves on each bogie. Normally, the relay valves are actuated by the pedal of the towing tractor and the rear steersman can apply all trailer brakes in emergency.

What Commercial Vehicle Users Want

(*Continued from page 11*)

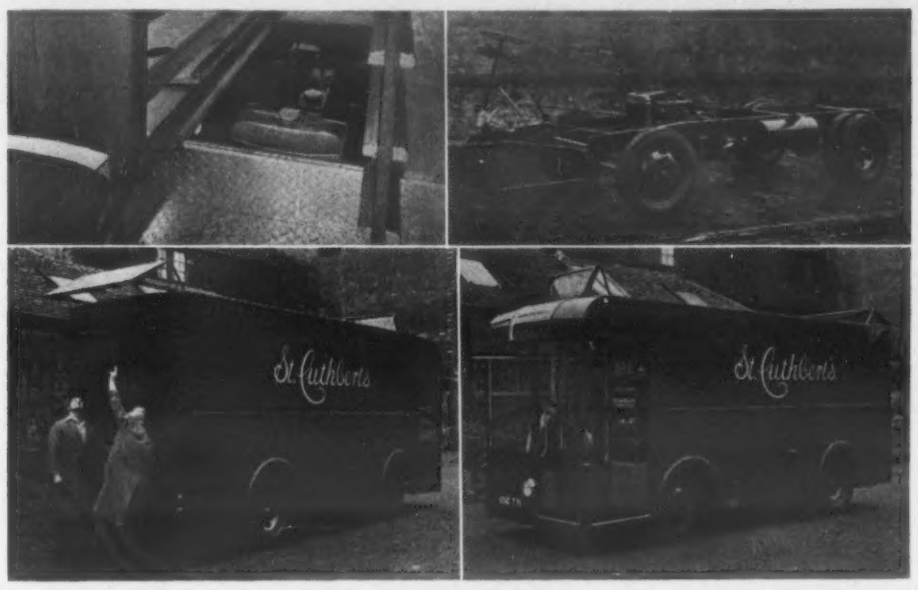
more than we care to realise, and it is for this reason that better efficiency here would be of immense national importance.

Considering the large number of vehicles embraced in this size now used for passengers and goods it is surprising that so little attention has hitherto been given to this most important aspect. There is a gross waste of vehicles in this country—too many are of the wrong design and too many do too little and this, accumulatively, has to be paid for in our cost of living.

Effect of Small Fleets

Perhaps the reason is to be found in the fact that this class of vehicle is sold in the largest multiple market where the operators own only two vehicles and are not primarily interested in vehicle design although they are conscious of the more economic operation of good design and many could guide our manufacturers if they could only speak collectively. Before the advent of the small diesel engine manufacturers were content to assemble a half-breed between a private car and a commercial vehicle, without consideration for its efficient use in operation; even now the small diesel has only been applied haphazardly.

While this state of affairs could only be possible in our multiple owner market it is refreshing to see signs of the more enlightened production of this size of vehicle being considered more seriously.



The diesel engine tucked away under the floor of a St. Cuthbert's van—a circular hole in the floor allows for topping up the radiator; right, the simple conversion of the Albion 30-cwt. chassis with stepped-down nearside member to accommodate cab entrance on corner; below, rear view with specially shaped rear view mirror through which driver can see tail lamps and 8 ft. behind the vehicle—there is no offside cab door for safety's sake; right, front door arrangements of the van are clearly shown

Manufacturers will know that where adequate thought and operational experience have been harnessed, success has been assured. It would seem that here is the market of tomorrow; but some hard thinking will require to be done to secure this trade from overseas competitors.

Success of the Small Diesel

The rapid development of the small diesel engine has now made possible an economic vehicle capable of working around the clock; this ability may be necessary earlier than we might be inclined to appreciate at the moment. Traffic congestion and the difficulty of making deliveries in city centres may mean deliveries being made off the normal peak traffic period, and with this in mind my undertaking has been developing deliveries on a two-shift basis for some time now.

Since November last we have had a Perkins Four 99 1.6-litre engine running in a CA Bedford van on two-shift working; its load has been as high as 17 cwt. and its fuel consumption, with frequent stop-starts, is just over 40 m.p.h., its actual average so far being 40.8 m.p.g. After nine months double-shift working, doing over 600 miles per week, the engine, which has had no major adjustments or mechanical attention, runs better than ever.

Car Comparison

In order that we should not present a freak performance we are comparing this engine with a similar one fitted into a Vauxhall Velox car fitted with an overdrive which is effective in second and top gears. Apart from a slight "hirple" of noise at cold starts, this car has the flexibility and performance of the best petrol car, with an astounding economy in fuel consumption. On give-and-take city work an average of 50 m.p.g. is obtained and on long-distance work, with the intelligent use of the overdrive, we have been able to get 65 m.p.g. and a comfortable 70 m.p.h.

Recently we tried a new 15-cwt. petrol van on the same job as the 1.6-litre diesel and the relative figures of fuel consumption were 1½ for diesel and 3½ for petrol. The vehicles were made to do identical jobs with the same loads and the same driver, so that we think a fair comparison has been made. From our experience in the pioneering of the small diesel engine we have now become fonder than ever of their capabilities so far as light commercial vehicles are concerned, and where they are used with intelligence and their working temperature properly controlled in a suitably designed vehicle they will give an unsurpassed performance.

Clean Diesel Exhaust

The bogy of exhaust gases being detrimental in a food-carrying vehicle is now completely laid, and in contrast the latest small engine is much cleaner, due to better design, and has also a much cleaner exhaust than any other mechanical unit. A feature of the 1.6-litre diesel is its cleanliness and freedom from smell and pungent exhaust gas such as is to be found on the average petrol machine.

Users of this type of engine will need no convincing that small diesels are now essential to the everyday operation of a work-a-day vehicle, whether it be carrying goods or passengers. Perhaps here it should be said that the time is now ripe for a "super derv" to be produced for small diesel engines just as we have better quality fuels for petrol engines. More refined derv may enable the small engine to idle quieter and perhaps perform with still more flexibility. This, together with a more refined form of control, is all that is now required to bring the small diesel within the range of all classes of operators.

Safe Reversing

Safe operation is of ever-growing importance today, especially so in hawking work in housing areas or in the delivery of goods to shops in busy thoroughfares. While we were reasonably pleased with the design of the front of our new delivery vans, we were concerned about the driver having to reverse in congested areas and in seeing any vehicle or person immediately behind when turning to the right. It is our experience that even when the vehicle carries one or two other individuals, such as porters, in addition to the driver, it is not always safe to reverse depending on someone to guide the driver. For this reason we prefer to have a positive mirror arrangement whereby the driver who is at the controls can actually see what is behind him and where he is going. He, alone, is thereby responsible and we have found this to be the safer way.

Our mirror arrangement, we feel, is still too large and cumbersome but it will serve a very useful purpose until we can evolve something better. The arrangement consists of a flat mirror behind the facia board on the top of the cab which can be seen by the driver through the glass top of the cab. This mirror reflects into the rear mirror which is fitted on the top rear end of the van at an angle of 45 degrees, this glass being specially shaped and bevelled to give a view to the driver of the rear of the van close enough to see his tail lights going on and embracing the van width for 8 ft. behind.

We feel that this is something which ought to be standard equipment on all vehicles and should be the manufacturer's concern.

(*To be continued*)

The remarkable Standard Atlas 10-12 cwt. van, with easy-access cab and engine amidships but designed for ready removal and replacement, on gruelling test in Spanish mountain country

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NEW standards of operating efficiency for normal-control goods vehicles are provided in the latest Bedford range just introduced by Vauxhall Motors, Limited. Salient features of the new range, which covers load capacities from 25 cwt. to 8 tons, when compared with earlier bonneted counterparts are lower loading heights, new long bodies, increased vision, smaller turning circles and larger, more-powerful brakes. Included are three vehicles with a load rating quite new for normal-control Bedfords—a four-tonner with 14-ft. body light enough to be powered by the Bedford four-cylinder diesel or 214-cu. in. petrol engine; a 6-cu. yd. 7-ton steel tipper with a 10-in. deep frame; and a 7-ton long-wheelbase lorry carrying a 16 ft. body.

An indication of the type of off-road testing the range has undergone before being presented

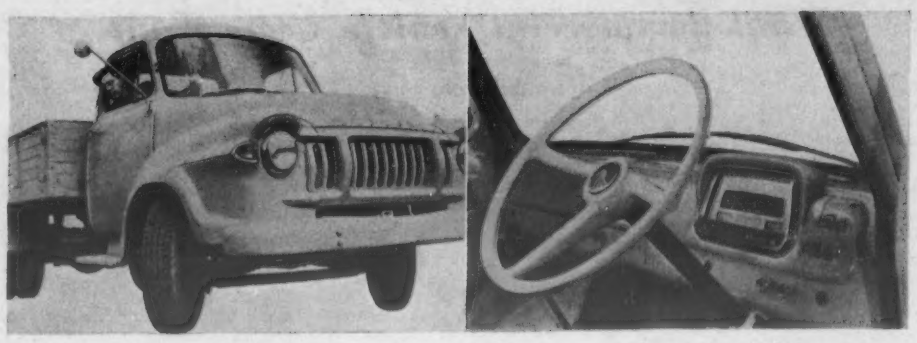
Improved Vision

A new bonnet line and a deep single-panel windscreen containing 63 per cent more glass than formerly provide first-class forward and sideways vision, which is also aided in vehicles up to 4 tons by narrower front wings, and rear quarter windows on all models improve the view to the rear. Measurements have shown that the length of road ahead concealed from the driver's view by the bonnet is 12 ft. less than in previous normal-control cabs. The new three-seat cab has easy access by means of a low-level step and its equipment includes deep comfortable seats, ventilation panes and winding full-drop windows in the doors, a large scuttle ventilator and a new hooded instrument panel directly ahead of the driver.

Loading height is as much as 7 in. lower than before. On the new 4-tonner, for example, the loading line unladen is only 3 ft. 5 in. from the ground, achieved partly through the use of a redesigned frame, wings and body mounts. But the major contribution is made by the fitting of 16-in. dia. wheels in place of the former 20-in. type on all the new chassis up to and including the 4-tonner. Tests are said to have proved that with these wheels tyre costs per ton-mile of payload are cut by as much as one-third.

Used for the first time on standard load-carrying lorries, the smaller wheels provide a number of advantages, namely lower cab entry height and loading height without the need for wheelboxes; improved riding qualities because of reduced unsprung weight and lower centre of gravity; smaller turning circles (improvements range from 3 ft. on the 6-tonners to 7 ft. on 25- and 35-cwt. chassis); reduction in total weight and overall drive ratio (the new 4-tonner dropside lorry with diesel engine weighs 6 cwt. less than the corresponding vehicle from the previous Bedford range); ability to handle a 4-ton payload in a lorry with a gross total weight of only 6¼ tons; and satisfactory performance from the Bedford four-cylinder diesel in the 4-tonner, which previously used the six-cylinder engine.

The larger models of the new range have stronger front axles and a new steering box, as fitted to the Big Bedford. With its 26 to 1 ratio, this gives easier control and longer life. In addition, the 7-tonners now have a tapered roller king-pin thrust bearing. The Bedford-built two-speed rear axle, which is fitted as standard on the new 7-ton normal-control chassis and on the larger forward-control chassis, has also been strengthened to increase its capacity to 18,000 lb. It now has larger wheel bearings, axle tubes and hubs and larger-diameter axle shafts. The Bedford axle is made in two sets of ratios—5.83 and 7.95 to 1 for lorry chassis and 6.4 and 8.72 to 1 for tractors.



Smaller turning circles and low cab step height are features and this l.w.b. 4-tonner can turn in 51 ft.; right, the new cab has single-pane windscreen and hooded instrument panel

Much Improved Brakes

With the introduction of the new normal-control range, all Bedford chassis of 3 tons and upwards, including the forward-control range, are now fitted with greatly improved brakes giving higher efficiency with lower pedal pressure. Wheel cylinder diameter has been increased from 1.3 to 1.5 in. on 3- and 4-tonners and from 1.5 to 1.625 in. on larger chassis. The rear shoe bisector and wedge angle has been increased from 13.5 to 17 deg. Together, these changes have increased the share of the work done by the front brakes. Distribution, which varies from model to model, averages 40 per cent front, and 60 per cent rear.

On chassis of 4-ton capacity and above, power assistance has been stepped up by increasing the size of the servo cylinder from 4.33 in. diameter to 5.25 in. At the same time the stroke of the master cylinder has been lengthened to allow for the greater displacement of fluid needed by the larger wheel cylinders. The handbrake linkage has been modified to compensate for the loss of mechanical advantage resulting from the greater wedge angle and the pedal has a wider pad. To compensate for the increased master cylinder movement the stem of the pedal has been lengthened by 1 in.

Brake lining areas have been increased and details are tabulated below.

Normal-Control Chassis	
25- and 35-cwt.	191 sq. in.
3- and 4-ton	313 sq. in.
5- and 6-ton and 8-ton tractor	436 sq. in.
7-ton	498 sq. in.
Forward-Control Chassis	
3- to 5-ton	373 sq. in.
6-ton	461 sq. in.
All other forward-control chassis	498 sq. in.

Front drum wall thickness has been increased by 35 per cent and on articulated tractors servo assistance is now provided for tractor brakes (previously hydraulic only), in addition to vacuum operation of trailer brakes as previously. The 4.33 in. servo unit is used on tractors.

Bedford engines are unchanged and on all models there is a choice of either diesel or petrol power. The 4-cylinder diesel engine is available up to 4 tons and the 6-cylinder diesel engine for the larger chassis, including tractor units. The 214-cu. in. 6-cylinder petrol engine is available up to and including the 6-ton lorry and also the 8-ton tractor and the 300-cu. in. 6-cylinder petrol engine is available in the 7-ton range. The Bedford close-ratio synchromesh gearbox is standard equipment on high power-to-weight-ratio chassis (25- and 35-cwt., l.w.b. 5-tonner and 7-tonners) and the five-speed constant-mesh gearbox is an optional fitting on 5-, 6- and 7-ton lorries and the 8-ton tractor.

★

L.M. FREIGHT SERVICES

"One-Way" Depots in Manchester

TO achieve improved rail transits and more efficient collection and delivery of goods in the Manchester district, the London Midland Region of British Railways is to convert the goods stations at Ancoats and Ardwick East into "one-way" depots handling outwards and inwards traffic respectively. The conversion work, which has commenced, will mark the first stage in the reorganisation of goods handling in the Manchester area designed to provide a more speedy and efficient service to traders. At present the Ancoats depot (ex Midland Railway) and the Ardwick East depot (ex Great Central Railway) function independently, handling both forward and received traffic. Under the new arrangements which have been prepared in consultation with the staff. Ancoats will become a forwarding depot and Ardwick East a receiving depot. Both will deal primarily with sundries traffic and certain full loads. Contractors for the work are R. G. Horton (Engineers), Limited.

At Ancoats the large goods shed will be extended so that all loading of forwarded sundries traffic can take place under cover, and the deck and small goods shed will be displaced. Road vehicle parking areas and three new traffic sidings are to be built and a mobile crane provided. Among the new equipment will be plant for the testing of vacuum brakes of wagons for express freight trains. At Ardwick East the new installations include additional sidings, capstans and fairleads and a through goods connection to Ancoats at Ashburys Junction. Provision will also be made for additional road vehicle parking areas, new electric platform trucks, and charging plant and a new petrol installation for road cartage motors. In addition, the Ancoats branch is to have the siding accommodation increased by five new double-ended sidings.

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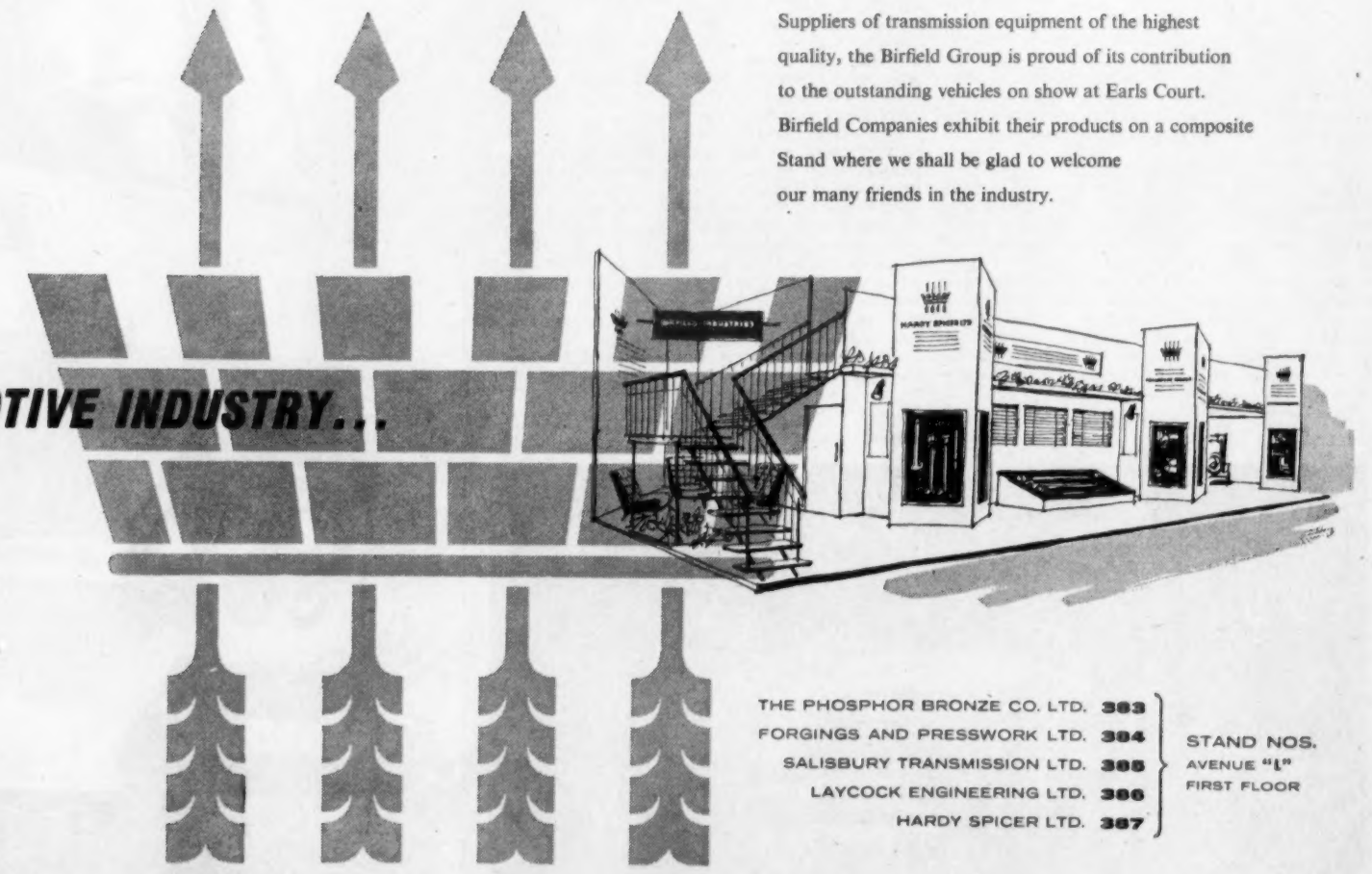

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MEDIUM ANTAR

New Thornycroft Oilfield Chassis

COMMERCIAL MOTOR SHOW Sept 28-Oct 4 EARLS COURT

ON the Thornycroft stand at the Commercial Motor Show is a new chassis designed by the company to conform to a specification laid down by the Oil Companies Materials Committee. The main requirements of the specification are a chassis of simple and robust construction with good accessibility for maintenance capable of operating both on and off the road. A wide margin of safety is called for in the design due to the necessity for the vehicle to operate fully laden over the most primitive of tracks, often in conditions of very high temperature.

Turbocharged Engine

The new Antar carries on the name and the traditions of the Thornycroft Mighty Antar and in fact has a rear bogie identical with that of the heavier vehicle, but it now appears with a Thornycroft designed and built diesel engine for the first time and with improved performance. The power unit is the Thornycroft KRN6S 691 cu. in. (11.33 litres) turbocharged direct-injection diesel engine which develops maxima of 210 b.h.p. at 1,900 r.p.m. and 625 lb./ft. torque at 1,000 r.p.m. Alternatively, an unblown engine of similar type can be fitted having an output of 165 b.h.p. and 508 lb./ft. torque at equivalent engine speeds. The cost in weight of the additional power provided by the Eberspächer turbocharger is a mere 40 lb.

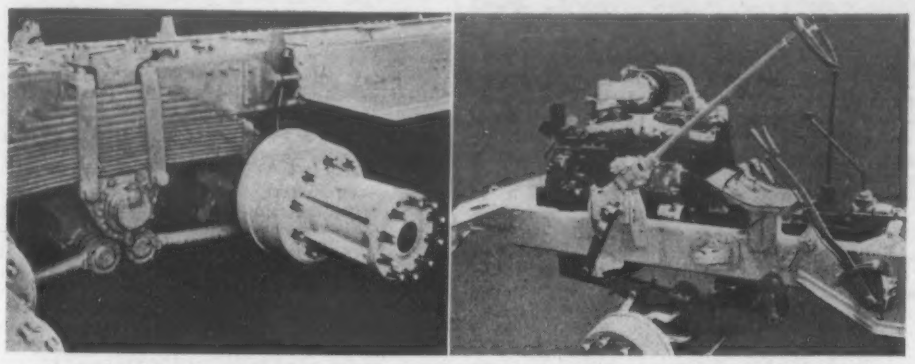
Transmission is through an 18-in. diameter single dryplate clutch, four-speed constant-mesh main gearbox and three-speed auxiliary gearbox providing 0.732, 1 and 1.728 to 1 ratios, thence by open tubular propeller shafts to both axles of the rear bogie. Drive to the front axle also can be provided. The driven axles are double-reduction units having primary overhead worm and hub epicyclic gears and are available with either 14.4 or 16.6 to 1 overall ratio. As mentioned earlier, the two-spring rear bogie arrangement is identical with that of the Mighty Antar.

Massive Frame

A massive frame with 35-ft. long main members of 11 in. by 3½ in. by ⅜ in. channel sections is braced at the centre by 17½-in. deep gusset plates and there are further flitching and bracing members located over the rear bogie. Standard tyres are 14.00-24 20-ply rating, with twins on the bogie, on 10.00-24 three-piece wheels. Cam-and-double roller steering gear with standard hydraulic assistance provides a turning circle of 87 ft. Air-pressure brakes on all wheels are powered by an engine-mounted twin-cylinder compressor and the brake drums have a total area of 2,147 sq. in. A multi-pull handbrake is mechanically connected to the bogie brakes.

Standard equipment includes a 24-volt electrical system, a full set of instruments including engine tachometer and spare wheel. Optional fittings include a steel cab, main-drive power take-off and winch with capacity up to 80,000-lb. pull.

The Antar has an overall chassis length of 35 ft. 1 in. and wheelbase of 23 ft. 6 in. for a body length of about 20 ft. Frame height laden at the rear axles is 3 ft. 10 in. and the overall width at the rear tyres is 10 ft. 3 in. Total weight of the chassis is 30,100 lb., the steel cab weighs 1,150 lb. and after an allowance of about 1,500 lb. is made for spare wheel, tools, fuel, water and so on, a margin of 73,250 lb. remains for body and payload within the recommended maximum gross weight of 106,000 lb.



The bogie of the new Antar is identical to that used in the heavier Mighty Antar; right, the turbocharged Thornycroft engine and front-end arrangement of the Antar

B.U.T. Trolleybuses

GLASGOW'S SINGLE- AND DOUBLE-DECKERS

TWO complete trolleybuses are exhibited at the Commercial Motor Show by British United Traction, Limited, on Stand No. 88 together with examples from the comprehensive range of B.U.T. rail traction equipment. One of the buses is notable for its body length of 34 ft. 5½ in., providing 50 seats in a single-decker. The two trolleybuses are for Glasgow City Transport Department and comprise an ETB1 two-axled chassis with a 50-seat single-deck body built by H. V. Burlingham, Limited, and a 9613 T two-axled chassis with a 71-seat double-deck body by Park Royal Vehicles, Limited. Both are fitted with Metropolitan-Vickers traction equipment.

One of 90

One of 90 now being supplied to Glasgow by B.U.T., the double-decker has a wheelbase of 18 ft. 7 in. and a body of all-metal construction, incorporating a 125-h.p. traction motor positioned forward of the rear axle on resilient mountings and cab-mounted master controller and contactor cabinet, includes battery manoeuvring and automatic acceleration features.

The long single-decker, one of 10 on order, has a wheelbase of 18 ft. 6 in. and is also fitted with Westinghouse compressed-air brake equipment and traction equipment by Metropolitan-Vickers. It incorporates the 125-h.p. motor positioned forward of the rear axle, a master controller mounted under the driver's seat and contactor gear in a dust-proof cabinet on the offside frame member, and also has automatic acceleration and battery manoeuvring equipment. Each trolleybus has alkaline batteries, providing 30-volt lighting and 60 volts for manoeuvring.

Representing the railcar activities of B.U.T. are two typical horizontal engines and transmission sets. One of the engines is a B.U.T. 15-litre turbocharged 6-cylinder diesel of Leyland origin, with unit-assembled Self-Changing Gears hydro-mechanical transmission pack which incorporates reversing gears and automatically controlled change speed gears. This is shown in association with the Serck Behr radiator with hydrostatic fan drive and temperature control. The overhead-valve 4-stroke direct-injection power unit has a capacity of 926 cu. in. and it produces a maximum torque of 867 lb./ft. at 1,250 r.p.m.

A B.U.T. 18-litre normally aspirated 6-cylinder diesel engine (the new A.E.C. AV1100) with unit-assembled Self-Changing Gears 18DF Schneider single-stage torque converter, comprises the other exhibit in the railcar field. This, too, is a 6-cylinder overhead-valve 4-stroke direct-injection water-cooled unit. Its capacity is 1,083 cu. in., the bore and stroke each being 6½ in. Maximum torque is 890 lb./ft. at 1,360 r.p.m.

Metrovick-equipped B.U.T. ETB1 trolleybus with Burlingham extra-long 50-seat body for Glasgow arriving at the show

the overall dimensions being 30 ft. by 8 ft. The 9613 T chassis has alloy steel channel-section frame sidemembers braced with tubular cross-members. The front axle beam, formed from an alloy steel stamping, has taper fit swivel pins carrying the stub axles, the vertical load being taken by hardened steel thrust buttons. Steering gear is of the worm and nut type. The rear axle is driven by an underslung worm running at 8¼-in. centres, with a ratio of 10⅓ to 1, to fully floating axle shafts. Both front and rear axles carry 4 in. wide reversed camber semi-elliptic springs.

Westinghouse compressed-air brakes operate on all wheels through individual brake chambers of the diaphragm type, the brake control valve being carried on the air reservoir which is charged by a unit-constructed two-cylinder compressor and motor. This unit is insulated by resilient mountings and the governor is mounted in the driver's cab. Metropolitan-Vickers traction equipment,

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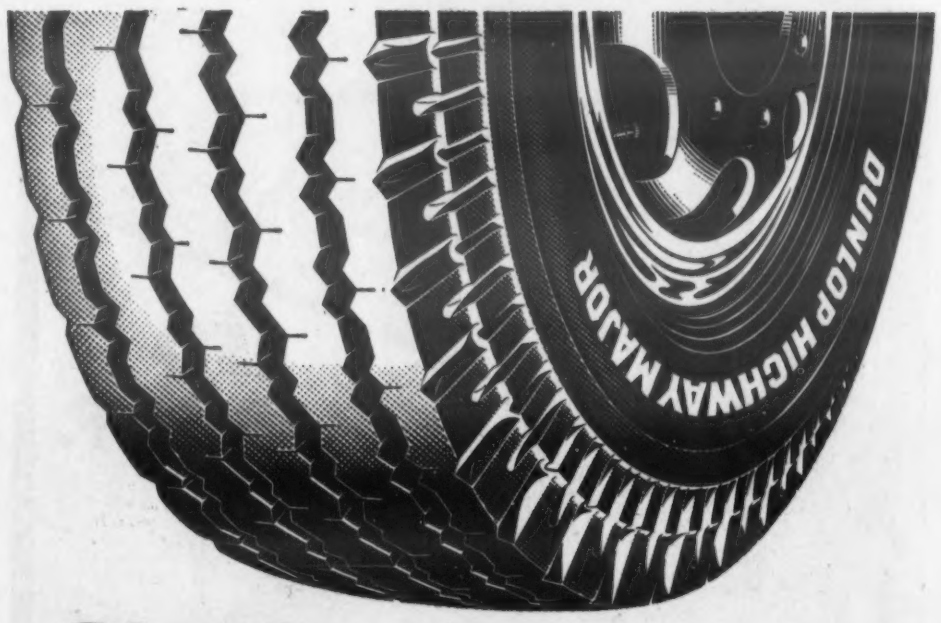

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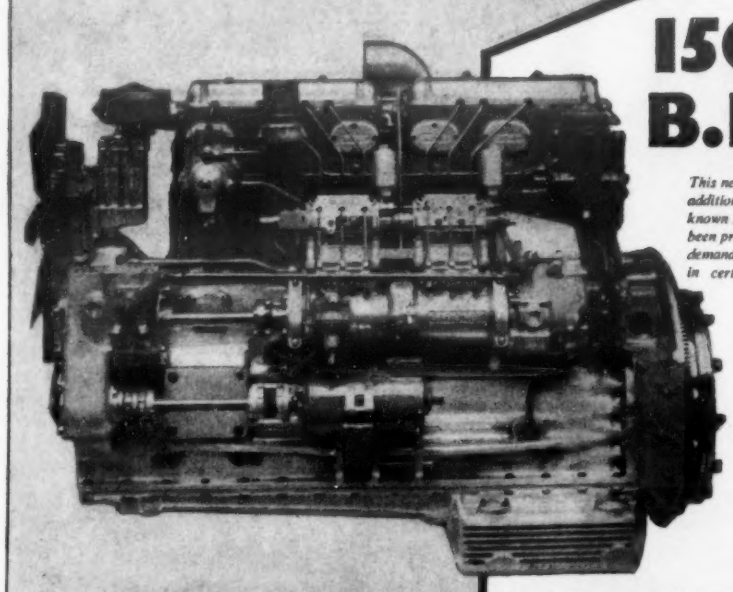

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LETTERS TO THE EDITOR

Ropeways in City Transport

The Editor is always glad to receive letters from readers on subjects germane to the transport industry, but these should be written as concisely as possible. The opinions expressed therein must not, however, be regarded as having editorial endorsement. Where correspondents desire to use a nom-de-plume it is essential that the Editor should be informed of the name and full address of the writer as indication of good faith.

Ropeways in City Transport

SIR,—One can wonder why ropeways should not be used as a means of city transport in congested areas. The Brussels exhibition proves clearly that cableways can be aesthetically arranged along modern avenues. Supporting poles can be planted on the edge of sidewalks with ground-level stations if the pavements are wide enough. If not, aerial or underground stations can be built.

Capacity does not seem to be a big problem. Let gondolas of even two persons travel (bumper to bumper) at a speed of 1.5 m.p.h. along a moving platform travelling at same speed (the principle of the American conveyor belt) and capacity increases from 450 persons an hour in each direction to about 2,400. This equals a bus route with vehicles of 100-passenger capacity following one another at 2½-min. intervals.

One calculates that the length of the moving belts allowing 30 sec. for getting off and getting on should be some 65 ft. and that of stations eventually 100 ft. It is true that a certain part of the public is not able to get on a moving platform. For these few persons microbuses can be installed, one-man operated.

The relative cheapness of first equipment of this means of transport would allow the building of lines in every street of importance. In wide streets two lines could be built, express and local.

As what regards speed, 12 m.p.h. would be sufficient in my opinion to beat the bus in congested areas. Speed in ropeways seems to be a question of flattening out vertical curves made by the (moving) cables, by heightening the banks of pulleys at supporting points.

Independent of private traffic and acting indeed as a conveyor belt, a traveller could reach destinations in much reduced time. Riding comfort is unequalled as a ropeway is noiseless, and one feels no more vibration in the seat of a moving gondola than when sitting on the ground. As buses and underground add to the strain of a working day, a ride home on a ropeway on the contrary would be relaxing. There seems to be a great future in ropeways as a means of city transport. Yours faithfully,

T. HOLEMANS.

Brussels.

Highland Steamers

SIR,—I was most interested in your current topic in your issue of August 30 on the subject of "Retrenchment in Highland Steamers." If I may say so, some of the facts are not quite correct. *Lochearn* has been all this season on the Tobermory—Oban service and return. Formerly, she was on the Tobermory—Coll—Tiree Castlebay (Barra)—Lochboisdale (South Uist) and return leaving Oban on Mondays and alternate days. Her place is now taken by the new ship *Claymore*. I did the return trip on her in July and a very commodious and comfortable ship she certainly is as I can testify. My recollection of *Lochinvar*—a much smaller ship—is that she does the Lismore ferry service from Oban but of this I am not absolutely sure.

It is certainly unfortunate for Portree and Skye that MacBraynes has to make this retrenchment but I should not think it would take such a step unless it was absolutely compelled by force of circumstances to do so.—Yours faithfully,

LAMBERT H. BAILEY.

56 *Oakleigh Gardens,*
London, N.20.

Multiple Delivery Van Design

(*Continued from page 19*)

influence on the overall dimensions of his vehicle; the turning circle in particular should be such that it can be manoeuvred speedily and without driver fatigue under the worst traffic conditions.

"We shake our bodies to pieces through light running more than we damage them in other ways," adds Mr. Brittain. "We therefore need suspension which will be just as efficient when the van is empty as when it is loaded." Air suspension is clearly the answer to this prayer. Bumpers need improvement; the normal type of bumper is steel, fitted to the chassis, but with projections at their end which usually interlock with other bumpers when manoeuvring under crowded conditions, particularly in the operating depot. It is suggested that investigations should be made of something in the nature of a fender such as is used in light marine craft. Fitted rubber fenders at the bows and round the stern of tugs and launches are now becoming a common feature and there seems to be a good case for developing the same class of protection at the front and rear of vehicles. They would protect the front end from traffic damage and the rear when reversing to a loading deck.

Delivery Times

The ideal delivery vehicle must be designed around the driver, not the load. The more help that can be given to the driver to make his deliveries quickly and without undue fatigue, the higher the earning capacity extracted from the vehicle. A walk-in or walk-through cab is an immense help in this connection. The driver can cross his cab to the nearside of the vehicle and thus not have to wait for traffic to clear on the offside; he would also be able to enter the front of his vehicle from the nearside of the cab, thus dispensing with the need to walk round the back of the vehicle, open and close the tailboard, pull down and roll up the shutters.

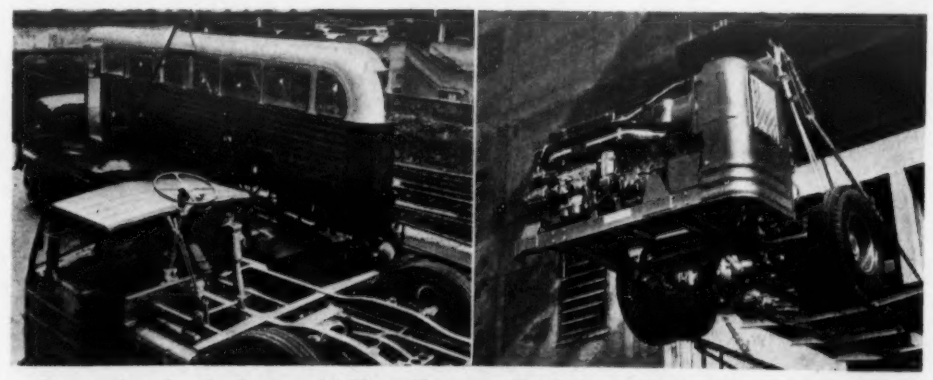
The cab floor must be a very low height, ideally not more than one step from the ground. Cab doors should either jack-knife, slide longitudinally or upwards into the roof. There are still a number of transport managers who look upon a cab door as a great time waster and would like to obviate this entirely. The driver will naturally have something to say about this, particularly in adverse weather conditions, but it should be possible to provide a heat barrier with a fan driving hot air, possibly through an extension of the radiator system. This method of heating is quite common in workshops and other premises where outside doors are continually being opened to the elements. Ample provision should be made in the cab for the disposal of driver's documents.

Body Features

The loading space is a fairly settled feature in design, but Mr. Brittain, while plumping for a translucent glass fibre roof, which is now normal practice in multiple-delivery vehicles, adds a proviso that it is not necessary to have the complete roof of this material. While it saves perhaps an hour of the driver's time in the depths of winter by enabling him to sort over the deliveries in good light, one has to think of the sun's rays in the summer, and a 4-ft. section down the centre of the van is sufficient, he thinks. Moulded plastics might also find a use in the construction of the roller shutter. It would reduce weight, with probably increased strength over wooden slats, and would obviate rattling when lowered.

The Dunlop service manual on disc brakes, *Car Disc Brakes, Mark I*, is now available, free of charge, from all Dunlop depots.

The Hoffmann Manufacturing Co., Limited, has taken larger premises for its office and stockroom in Glasgow to enable it to give better service. The new address is 75 Robertson Street, Glasgow, C.2 (telephone CENtral 0468-9).



Preparations for the Commercial Motor Transport Exhibition at Earls Court: the section of a bus body arrives for the Metal Sections stand; right, the chassis of the Leyland Atlantean suspended from a crane for transfer into the exhibition hall

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SOCIAL AND PERSONAL

Minister to Open R.H.A. Conference

THE Minister of Transport, Mr. Harold Watkinson, has accepted an invitation to open the annual conference of the Road Haulage Association at Torquay on October 14. He will make a statement following the official welcome to delegates from the Mayor of Torquay. Following the Minister, it is expected that the R.H.A. national chairman, Mr. R. N. Ingram, will make a statement and propose a resolution bearing upon the political situation of the road transport industry. The R.H.A. conference is preceded by the Socialist party conference (next week) and the Conservative conference the week after.

* * *

Mr. D. M. Jinks, B.Sc., has recently been appointed joint managing director of Cleco Electric Industries, Limited, Leicester. He secured his degree while an apprentice with the company, attending the Leicester College of Technology on a part-time course.

* * *

In accordance with his practice over the years, the governing director of Fodens, Limited, will be on his company's stand during the Commercial Motor Transport Exhibition at Earls Court. Mr. William Foden celebrated his 90th birthday last Tuesday (September 23) and continues to cope most happily with the business affairs of the company to which he has given 65 years' service.

Mr. William Foden

Mr. T. M. Hopwood

* * *

We record with regret the death of Mr. D. S. Thomson, system vice-president of the Canadian Pacific Railway, in Montreal, at the age of 62. He joined the C.P.R. before he was 15 as a messenger in Montreal.

* * *

The annual general meeting of the Institut du Transport Aérien will be held this year on October 14 in Paris. I.T.A. is an international non-profit centre for study of economic, technical and policy sides of air transport and air work.

* * *

Counsel and lay representatives paid tribute to Mr. A. G. Curtis, chairman of the East Midland area Traffic Commissioners and East Midland area Licensing Authority, when he sat in Nottingham for the last time on Wednesday last week. Mr. Curtis has been appointed Transport Commissioner for Wales and Monmouthshire, a post he will take up on October 1. Mr. A. C. G. Rothera said that under Mr. Curtis's chairmanship, a happy atmosphere had prevailed in the court. It was a compliment to Mr. Curtis's ability that not one of his decisions had been upset on appeal during his term in office, and the number of appeals had been infinitesimal.

* * *

Mr. Ian T. Morrow, who was managing director of the Brush Group and resigned on the absorption of the group within the industrial division of the Hawker Siddeley Group, has also resigned the chairmanship of Brush Electrical Engineering Co., Limited, Brush Traction, Limited, and Mirrlees, Bickerton and Day, Limited. He told MODERN TRANSPORT: "I have very much enjoyed my connection with traction engineering and I very much hope that I shall have a further opportunity for association with it and with the transport industry."

Mr. Ian T. Morrow

* * *

A new appointment to the Ruston and Hornsby, Limited, research centre at Lincoln is Dr. R. V. Hughes, who previously was with the English Electric Co., Limited, at Rugby as its chief projects engineer, diesel engine division.

* * *

The appointments of Messrs. J. Higginbotham, as deputy general manager, J. D. Studholme as assistant general manager, and A. Brunton as commercial manager, are in the engineering department of Edgar Allen and Co., Limited, and not to the company as a whole, as was stated in our last issue.

* * *

The autumn lunch meeting on October 20 of the London and Home Counties division of the Traders Road Transport Association will have Mr. Harold Watkinson, the Minister of Transport, as chief guest. He will be inaugurating the T.R.T.A. "Kerb Space is Precious" campaign.

* * *

A series of twenty-four lectures will be delivered by Mr. E. Course, B.Sc.(Econ.), in an historical and economic survey of transport by rail, road and water, with special emphasis on Southern England, at the College for Further Education, Poole, on Wednesdays at 7.15 p.m., beginning this week. The fee for the course is £1. The same lecturer will give a course of twenty-four lectures in the form of a series of studies of the transport systems of selected areas, such as the Black Country and Greater London, at the University of Southampton on Fridays at 7.30 p.m., beginning October 3. The fee for this course is 15s. The British Transport Commission and certain other undertakings are prepared to reimburse the fees of employees who complete the course.

The late Sir Gurney Braithwaite, a former Parliamentary Secretary, Ministry of Transport, and a member of the Stock Exchange, left £11,003.

* * *

The grand council of the Federation of British Industries has elected Mr. William H. McFadzean as deputy president. Mr. McFadzean is chairman and managing director of British Insulated Callender's Cables, Limited.

* * *

Mr. T. M. Hopwood, manager of the traffic and printing department of the Bell Punch Co., Limited, whose retirement on October 31 next has already been briefly announced in our columns, is an expert on traffic system problems whose knowledge and advice are valued in many parts of the world. Tom Hopwood is a native of Worcestershire and was educated at Worcester Royal Grammar School and at Ellesmere College. He joined the Army at the very beginning of the 1914 war, on August 5, and served in Egypt, Gallipoli and with the Royal Artillery in France. He rose from the ranks to hold a commission. After the war he was for a time with a champagne importing company which was hard hit by import taxes. Looking for a more secure field, he joined Bell Punch in November, 1923, nearly 35 years ago, as a ticket punch record clerk. His talent was early apparent and he went to Egypt in 1930 to settle a ticket system for the Egyptian Omnibus Company. He went on to other members of the Overseas Transport Company's group and since then he has devised systems for all sorts of transport undertakings from the buses of Amsterdam to the railways of Venezuela.

* * *

The eleventh annual dinner-dance of the Traders Road Transport Association will be held at Grosvenor House, Park Lane, London, W.1, on November 3. The traditional ban on speeches will be observed.

* * *

At a meeting of the Institution of Locomotive Engineers at 1 Birdcage Walk, London, S.W.1, on October 15, Mr. S. O. Ell (British Railways, Western Region) is to read a paper, "The Mechanics of the Train in the Service of Railway Operation." There is to be a visit, open to members and their guests, to the Fraser and Chalmers works of G.E.C. at Erith, followed by a visit to the J. Stone works at Charlton, on October 31.

* * *

Sir Robert A. Cary, Bart., M.P., has been appointed chairman of Lancashire United Transport, Limited, and Mr. F. A. Willink, O.B.E. M.A., becomes deputy chairman. The appointments are to fill vacancies caused by the death of Mr. H. M. Alderson Smith.

* * *

Birfield Industries, Limited, announces that Mr. W. B. Broadbent, A.M.I.Loco.E., is joining its railway division on October 1. Mr. Broadbent was apprenticed at the Crewe L.M.S.R. works from 1942 to 1945, and after subsequent training in the motive power and traffic departments, held appointments at Euston headquarters and a number of motive power depots, including Barrow, Macclesfield, Rhyl, Holyhead and Rugby, before joining the Mobil Oil Co., Limited, in 1951, as engineer, railway department. He was appointed a director of the Festiniog Railway in 1955.

Mr. W. B. Broadbent

* * *

Mr. Alfred F. Mann has been appointed editor of *The Transport Journal* in succession to Mr. George W. Kelland, who has left to join the Birfield group, as already announced. Mr. Mann has been connected with the transport industry for many years and was associated with *Transport World* until 1954. He later joined *The Transport Journal* for a short spell, and recently has been editorial officer of the Industrial Division, Ro.S.P.A.

* * *

Duple Motor Bodies, Limited, announces that the board of its recently acquired subsidiary company, Willowbrook, Limited, has been reconstituted. The chairman, Mr. H. W. Sydenham; the managing director, Mr. G. R. White; and the works director, Mr. H. J. Bigg of the parent company, join the Willowbrook board. Mr. R. Beechey Newman, M.B.E., sales manager of the parent company, is elected to the Willowbrook board as sales director. Mr. W. Sutton and Mr. E. J. Foster continue as directors of Willowbrook, Mr. Sutton as managing director. It is not intended that there shall be any change in the manufacturing activities of the Willowbrook company, which has a considerable amount of work on hand including a contract for 150 standard buses for the B.E.T. companies. Duple Motor Bodies (Midland), Limited, whose activities do not conflict with those of the Willowbrook company to any great degree, will continue as a separate but kindred entity. In order to strengthen the sales organisation in the north of England and to provide spares and service facilities for operators in that area a new company, Duple Motor Bodies (Northern), Limited, is to be formed with headquarters in Manchester.

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IMPORTANT CONTRACTS

C.N.R. Car Transporters

AN order for 125 double-deck motor car transporter wagons at a cost of $2,600,000 has been placed by Canadian National Railways with Canadian Car Company, Montreal. The new wagons will be similar in design to 25 vehicles put in service 18 months ago—the first of their type anywhere. Fifty will have a carrying capacity of eight Canadian-built or 10 European-size cars and their dimensions will be identical with the wagons now in service. The remaining 75 will be smaller, handling six large or eight small cars. The 50 large-size transporters will be 78 ft. long—34 ft. longer than a standard boxcar and the smaller ones 60 ft. long. Features of the design are a shock-proof tie-down apparatus and a lightweight ramp for loading and unloading the upper deck.

Alhambrinal for Wallasey Buses

Six sets of Alhambrinal panelling have been ordered by Wallasey Corporation Transport for interior decoration of the Leyland Atlantean bodywork on order from the M.C.W. organisation for that undertaking. Alhambrinal is produced by Thomas Thomson Sons and Co. (Barrhead), Limited, at Fereneze Works, Barrhead, near Glasgow.

Lightship for Mersey Bar

At a recent meeting of the Mersey Docks and Harbour Board, it was decided to accept the tender of Philip and Son, Limited, Dartmouth, for the construction of a new lightship for the mouth of the River Mersey to replace the present lightship *Alarm*, which has been in service for 45 years. The new vessel will be similar to those used by Trinity House, 25 of which had been built by Philip and Son since the war.

North Eastern Region Contracts

Recent contracts placed by the North Eastern Region of British Railways include the following:

Concrete (Scotland), Limited, Falkirk, for concrete girders for two bridges for Alne—Pilmoor widening.

Holmpress Piles, Limited, Hull, for piling to columns of bridge at Dringhouses, York.

Kitchen and Wade, Limited, Halifax, for a radial drilling machine.

J. Parkinson and Son (Shipley), Limited, Shipley, for a universal miller.

Chippindale (Engrs.), Limited, Leeds, for four 1 cu. yd. capacity Orion dumpers.

V.B.C. Orders from Poland

Orders have been received by the Vacuum Brake Co., Limited, from Metalexport, Poland, for the supply of vacuum brake equipment for rolling stock which the latter company is manufacturing for the Indian and Moçambique railways. Orders have been or are being completed for Indian Government Railways for the equipment for 650 bogie carriages and 30 WP-class locomotives and tenders; and for Moçambique Railways for 390 goods wagons. The value of the orders to the Vacuum Brake Company is approximately £120,000.

Eastern Region Contracts

The Eastern Region of British Railways announces the following contracts:

I.T.D., Limited, London, W.11, for two fork-lift trucks with battery chargers and special jib attachment for Chesterfield.

Costain Concrete Co., Limited, London, S.W.1, for six pre-stressed concrete footbridges.

Clough, Smith and Co., Limited, Crawley, for e.h.v. and m.v. cable installation at Parkeston Quay.

Aerocem, Limited, London, W.1, for four sets of grouting equipment.

Metropolitan-Vickers GRS, Limited, London, W.C.2, for telecommunications cable installation between Greenwood and Potters Bar.

Steels Engineering Products, Limited, London, S.W.1, for one Coles S410 diesel-electric mobile crane and one Coles S410 diesel-electric mobile crane complete with electro magnet and ancillary equipment for Chesterton Junction Central permanent way depot.

Scottish Region Contracts

The following contracts have been placed by the Scottish Region of British Railways:

Paterson Hughes Engineering Co., Limited, Glasgow, for a 25-ton electric travelling crane at Bridgeton Goods Station, Glasgow.

John Boyd and Co. (Engrs.), Limited, Annan, for two 7-ton fixed jib manual yard cranes for Lockerbie and Newton Stewart.

Whittaker Hall and Co. (1929), Limited, Manchester, for a rotary air compressor at St. Rollox Works, Glasgow.

The Consolidated Pneumatic Tool Co., Limited, London, for Hi-cycle tools and frequency changers, for St. Rollox Works, Glasgow.

Alex Findlay and Co., Limited, Motherwell, for steelwork in crane gantry, portal frames and tup tester, Motherwell permanent way depot.

Murdoch Mackenzie, Limited, Motherwell, for sub-structure of new underbridge at Thornton.

P. and W. MacLean, Limited, Glasgow, for supply and erection of footbridges at Partick Hill, Anniesland, Westerton, Drumchapel, Drumry, Singer, Dalmuir Park, Bearsden and Hillfoot in connection with Glasgow suburban electrification.

Italian Rolling Stock for Argentina

The Italian engineering firm, Grupo Aziende Italiane Argentina, has submitted a proposal to establish two plants in Argentina for the production of railway rolling stock. G.A.I.A. was successful in tendering for the supply to the Argentine State Railways of 280 diesel-electric locomotives, powered by Fiat diesel engines made in Córdoba. The first 80 units will be built in Italy without the diesel engines, which will be fitted in Argentina, and the remaining 200 units will be built in Argentina with 80 per cent of their components of Argentine manufacture. The electrical components will be supplied by the Siam di Tella plants in Argentina and the coachwork will be by Cometarsa, of Campana. The plant to be erected and other work represents an investment of some 1,000 million pesos.

SHIPPING and SHIPBUILDING

P.L.A. Records

SHIPPING entering and leaving the Port of London during the year ended March 31, 1958, constituted another all-time high record at 75,242,200 net register tons, over 3,650,000 tons greater than the record figure for 1956-57. The net register tonnage, 34,053,178, using P.L.A. dock premises, was over 1,700,000 tons more than in the previous year. Tonnage of goods passing through the port was likewise a record at 55,489,392 tons. Exports to foreign countries, however, fell by about 400,000 tons, largely due to reductions in cement shipments. Coastwise trade was some 500,000 tons up, inward coal traffic being mainly responsible. On the other hand the numbers of passengers embarking or disembarking in the docks and at Tilbury landing stage dropped from 94,528 to 76,103 and from 121,576 to 108,765 respectively.

Collier in New Guise

STARTING her trials as a cable-laying vessel this week was the former Central Electricity Authority collier *Dame Caroline Haslett*. If her experimental laying of lengths of cable proves successful, it is expected that she will be used to take part in laying the proposed £4½ million cross-Channel power link between Britain and France during the summer of 1960.

Greenock Dry Dock

PLANS for the construction of a new intermediate dry dock at Greenock, costing £250,000, were announced on September 15 by Mr. T. G. D. Galbraith, Civil Lord of the Admiralty, when he visited Greenock. At the offices of the Greenock Harbour Trust Mr. Galbraith inspected the plans for the graving dock which it is proposed to construct at the Great Harbour, Greenock, at a cost of £6,000,000. He was also shown the plans for the intermediate graving dock, which the Harbour Trust proposes to construct at the East India Harbour, to the north of the existing dock.

New Minister for Colombo Port

THE Prime Minister of Ceylon has created a fifteenth Ministry—the Ministry of Nationalised Services and Road Transport—and appointed 50-year-old Senator C. Wijesinghe. He therefore becomes Minister in charge of the Colombo Port Corporation. Senator Wijesinghe said: "My first job will be to clear up the long queue of ships outside the Port of Colombo. I will take the bull by the horns and see to it that the port functions smoothly and efficiently without giving cause for any complaint from anyone." The new Minister is said to have decided on piece-rate payment for cargo handling in the port area. Immediately upon the appointment of Senator Wijesinghe, the chairman of the Colombo Port Cargo Corporation, Mr. M. F. de S. Jayaratne, resigned. The new Minister appointed Mr. S. Amarasinghe, Permanent Secretary to the new Ministry, as chairman of the Corporation. Senator Wijesinghe said he accepted the resignation with regret and his acceptance of it was no reflection on Mr. Jayaratne's ability. He was Permanent Secretary of the Ministry of Transport, which no longer has jurisdiction.

★

TENDERS INVITED

THE following items are extracted from the Board of Trade Special Register Service of Information. Inquiries should be addressed, quoting reference number where given, to the Export Services Branch, Board of Trade, Lacon House, Theobalds Road, London, W.C.1.

September 30—Korea.—International Co-operation Administration for six diesel-engined CRAWLER TRACTORS with 74-in. BULLDOZERS and 20-in. hard grouser tracks, and eight 135-h.p. diesel RUBBER-TYRED TRACTORS and two- or four-wheeled scrapers. Tenders to the Office of Supply, Government of the Republic of Korea, Seoul. (ESB/22385/58/ICA.)

October 1—Burma.—International Co-operation Administration for three 50-60 h.p. petrol-engined four-wheel-drive UTILITY VEHICLES and one 10- or 12-seat bus. Tenders to the Union of Burma Applied Research Institute, Ministry of Industry, Kanbe, Rangoon. (ESB/20867/58/ICA.)

October 1—Belgian Congo.—Ministry of Colonies, Brussels, for 36 petrol- and diesel-engined VEHICLES and TRAILERS. Copies of the specifications from the Service des Approvisionnements du Ministere des Colonies, 1 rue de la Regence, Brussels, for B.Fr.50. (ESB/22449/58.)

October 8—Vietnam.—International Co-operation Administration for 125 100-h.p. petrol-engined 5,000-lb. g.v.w. PICK-UP VANS with standard equipment, accessories and tools. Tenders to the Central Purchasing Authority, P.O. Box 131, Saigon. (ESB/22343/58/ICA.)

October 8—Ceylon.—International Co-operation Administration for two four-wheel-drive 1-ton capacity PICK-UP VANS and two six-seat UTILITY VEHICLES, all petrol-engined. Tenders to the Chairman, Tender Board, Ministry of Transport and Works, P.O. Box 547, Colombo, 1. (ESB/20800/58/ICA.)

October 8—Union of South Africa.—Natal Roads Department for up to four 10-13 cu. yd. WHEELED TRACTOR-SCRAPER UNITS (ESB/22782/58, 9s.); up to 10 two-axled WATER SPRINKLER TRAILERS (22783, 8s.); one self-propelled 1,000-gal. BITUMEN SPREADER (22784, 11s.); up to six 9-seat UTILITY VEHICLES (22785, 6s.), and up to eight petrol-engined 2½ cu. yd. TIPPING LORRIES (22788, 8s.). Photocopies of tender documents from Export Services Branch, B.o.T., quoting ESB number and enclosing postal order for the price bracketed after each item above.

October 9—Pakistan.—Department of Supply and Development for three fully furnished, heated and air-conditioned small AMBULANCES. Tenders to the Deputy Director-General of Supply and Development, Chittagong. (ESB/22320/58.)

Advance Information—Pakistan.—Tenders are expected to be issued shortly for the provision of electrical interlocking signalling systems on the metre-gauge sections of the Eastern Bengal Railway. The sections involved are Chittagong—Akhaura, Bhairab Bazar—Tangi, Tangi—Narayanganj and Tangi—Mymensingh, involving 38 stations. It seems it is also the intention to issue tenders for equipment to convert 21 blocks, now operated with tokens, into tokenless blocks and, after the completion of the present proposals, to convert other stations to interlocking signalling.

★

B.T.C. TRAFFIC RECEIPTS: PERIOD NO. 9—1958

	Four weeks to September 7, 1958			Aggregate for 36 weeks		
	1958	1957	+ or —	1958	1957	+ or —
	(£ thousands)			(£ thousands)		
PASSENGERS						
British Railways	12,940	12,455	+ 485	99,607	101,820	— 2,213
London Transport						
Railways	1,775	1,693	+ 82	16,889	15,976	+ 913
Road services	4,276	4,476	— 200	31,629	41,290	— 9,661
Provincial and Scottish Buses	5,538	5,206	+ 332	42,239	40,603	+ 1,636
Ships	1,259	1,244	+ 15	5,521	5,500	+ 21
Total passengers	25,788	25,074	+ 714	195,885	205,189	— 9,304
FREIGHT, PARCELS AND MAILS						
British Railways						
Merchandise and livestock	6,362	7,735	— 1,373	63,614	74,351	— 10,737
Minerals	2,993	4,081	— 1,088	31,334	36,371	— 5,037
Coal and coke	8,031	9,464	— 1,433	85,139	86,045	— 912
Parcels, etc., by passenger train	4,030	4,071	— 41	35,562	34,737	+ 825
Collection and delivery, etc.	929	1,013	— 84	8,554	9,260	— 706
Total Freight British Railways	22,345	26,364	— 4,019	224,197	240,764	— 26,567
Others	4,197	4,355	— 158	37,364	37,915	— 551
Total Freight, Parcels and Mails	26,542	30,719	— 4,177	261,561	278,679	— 17,118
Aggregate	52,330	55,793	— 3,463	457,446	483,868	— 26,422

Comparisons are affected by increases in rates which have been authorised from time to time, by the provincial and Scottish bus strike from July 20 to 28, 1957, by the London Transport road services strike from May 5 to June 20, 1958, and by the restrictions in oil supplies which operated from November 7, 1956, to May 14, 1957

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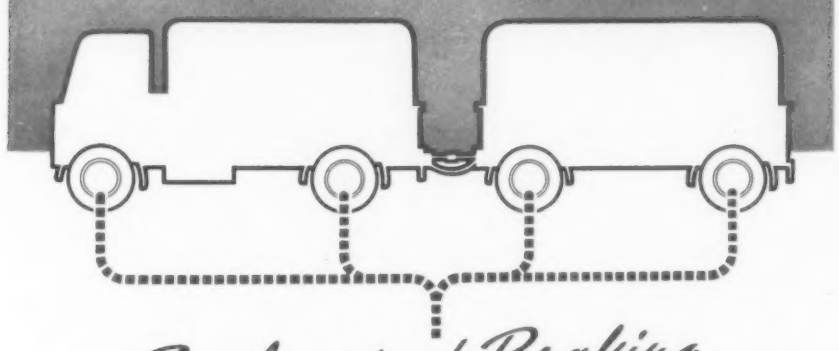

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